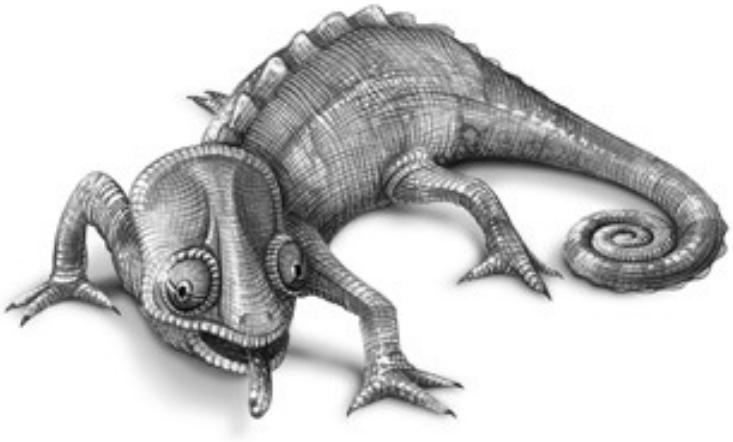

kameleon MD

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

KAMELEON LIGHTING SYSTEM

121-19260

gentec

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LOGBOOK

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DOCUMENT APPROVAL

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1. INTRODUCTION

1.1. Origin and scope

The Installation, Operation and Maintenance Manual for the Kameleon lighting console was developed following the design, the design testing and operational trials of the Kameleon lighting console.

This technical reference manual provides users of the Kameleon lighting console with all the relevant information for installing, implementing, operating, troubleshooting and maintaining the various cards.

1.2. Product objectives

Kameleon is Gentec's trademark for its new central lighting system. The system consists of leading-edge technology, in both hardware and software components.

Its hardware design is innovative in its use of the Echelon technology, a recent development. Found in more than 3,500 products in the world, it is the most widely used technology in industrial automation. As an open technology, it allows Gentec to use and include devices from various manufacturers in its lighting system. Echelon also manufactures many types of routers to access a large number of communication medias such as wire pairs, optical fiber, infrared, Hertzian waves, and IP protocol.

Its software design is innovative because of its Windows-type graphical user interface. The new Gentec console makes it possible to configure the system (through programming) and to operate it using a Microsoft Windows-compatible software, which makes it very user-friendly. Through mere mouse clicks, shifting a control relay from one group to another becomes as easy as moving files in Windows Explorer.

1.3. Acronyms and abbreviations

CDA	Power Distribution Card
CCE	Lighting Control Card
CCEIN	Lighting Control Card In
CCEOUT	Lighting Control Card Out
CHR	Network Scheduler Card
CPLD	**C**omplex **P**rogrammable **L**ogic **D**evice
LED	Light Emitting Diode
E/S	Input-Output
FLASH	Electrically Erasable Memory
GND	**G**rou**ND**
Lc	Design List
Lm	List of Material
MALT	Grounding
MIOE	Installation, Operation and Maintenance Manual
Mo	Mb
PAL	**P**rogrammable **A**rray **L**ogic
PC	**P**ersonal **C**omputer
PCB	**P**rinted **C**ircuit **B**oard

PIE	Inspection and Test Plan
PLCC	**P**lastic **L**eaded **C**hip **C**arrier
RAM	**R**andom **A**ccess **M**emory
RAZ	Reset
ROM	**R**ead-**O**nly **M**emory
SR	Relay Output
SRAM	**S**tatic **R**andom **A**ccess **M**emory
SDRAM	**S**ynchronous **D**ynamics **R**andom **A**ccess **M**emory
TTL	(**T**ransistor - **T**ransistor **L**ogic
UART	**U**niversal **A**synchronous **R**eceiver **T**ransmitter

1.4. Reference documents

International Standards

Reference	Description
CEI 68-2-2	Environmental Tests: Dry-heat Tests
CEI 801-4	Resistance to H.V. Interference Tests

2. DESCRIPTION OF HARDWARE

2.1. Overview

The new Kameleon console consists of three parts: the computer-based console, the control and command cards, and the power element or relay.

The console is used for configuring, that is, for programming the various control algorithms and allows the operator to take action (for instance, remote operation of a light or modifying the schedule). With the adequate password level, a programmer can access every command for installing and verifying control cards, for grouping relays and linking them with the network switches and the schedulers. The console is also used to monitor daily operations of the lighting system. Real graphs (for example, top views of building floors) make it possible to view the actual state of lights, to turn them on with a mere mouse click, or to change the related scheduler parameters (see Chapter 5 for more information).

The control card network, located in the relay panels, is the core and control of the lighting system. The computer console is used to parameterize and view the system, but all the control algorithms are card-resident and controlled by the cards. Therefore, once the cards are configured, they will manage the system independently, even if the computer is off-net. Cards are linked together through the Echelon LonWorks network, that is, by a pair of twisted wires (see Chapter 4). This net links all the relay panels together in a complete and unique system so that the panels no longer exist as far as programming is concerned. A group of relays can include items from several panels. Control cards include the Lighting Control Card – Input (CCEIn), the Lighting Control Card – Output (CCEOut), the Network Scheduler Card (CHR) - Scheduler and Network Scheduler Card (CHR) - serial port, each being independent, with its own processor, RAM, ROM, Echelon communication port, and its input and output elements (see Section 2.2).

The power element directly commands or feeds the various lights in a specific lighting zone. Once again, Gentec is innovative in making the output cards compatible with the various relays available, whether it is the Gentec Aromat two-wire relay, the three-wire relays or any relay that uses less than 24V DC or AC coils.

2.1.1. 16-relay panel

The 16-relay panel includes the power distribution card (CDA) and a maximum of one light control card-input (CCEIn), a light control card-output (CCEOut), one network scheduler card (CHR), in real-time scheduler and analog-digital converter versions, and one serial port communication card.

2.1.2. 32-relay Panel

The 32-relay panel includes one CDA and a maximum of two CCEIns, two CCEOuts, one CHR, in real-time scheduler and analog-digital converter versions, and one serial port communication card.

2.1.3. 64-relay Panel

The 64-relay panel includes one CDA and a maximum of four CCEIns, four CCEOuts, one CHR, in real-time scheduler and analog-digital converter versions, and one serial port communication card.

2.1.4. Typical network connection

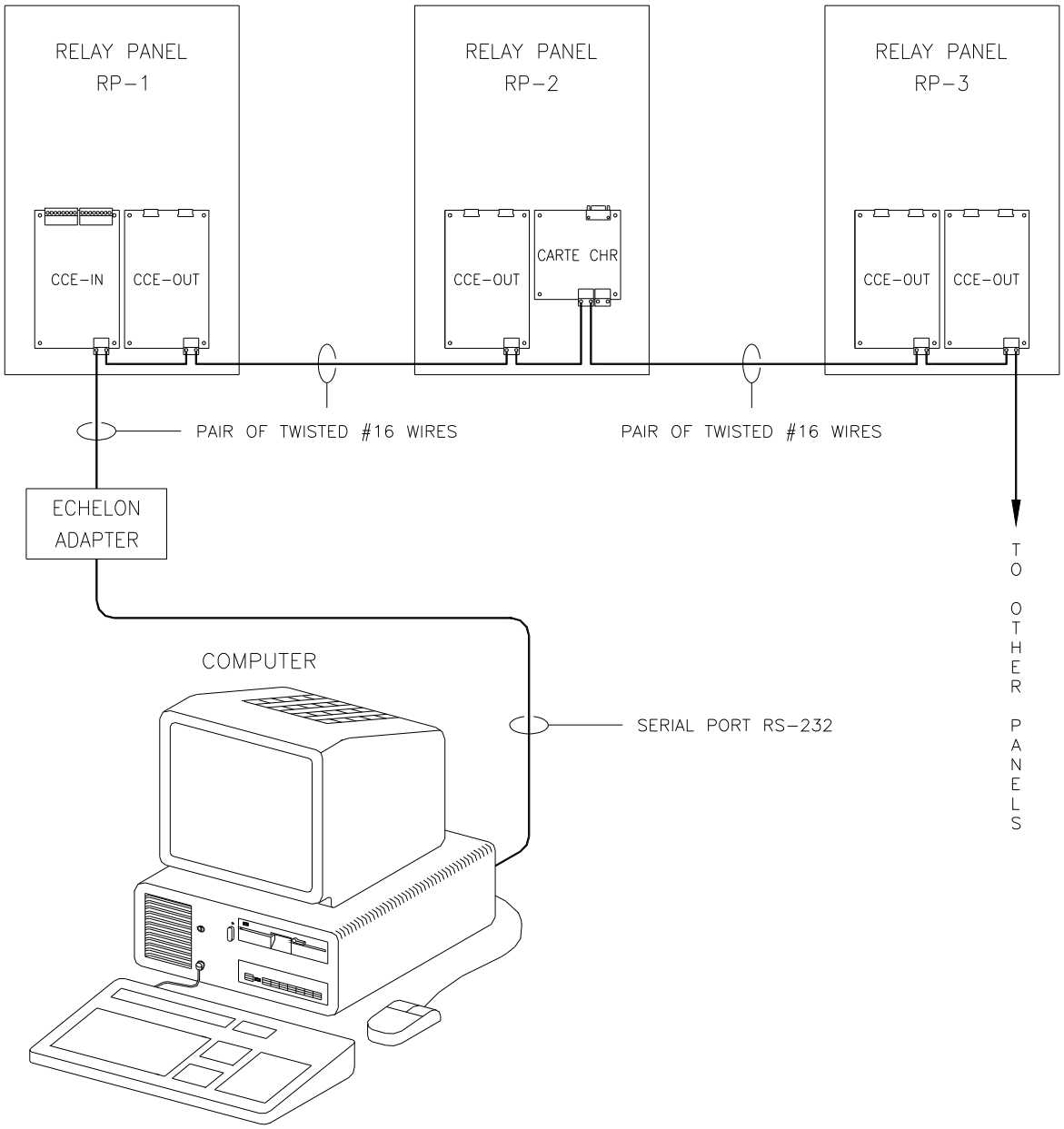


Figure 2-1: Typical Network Connection

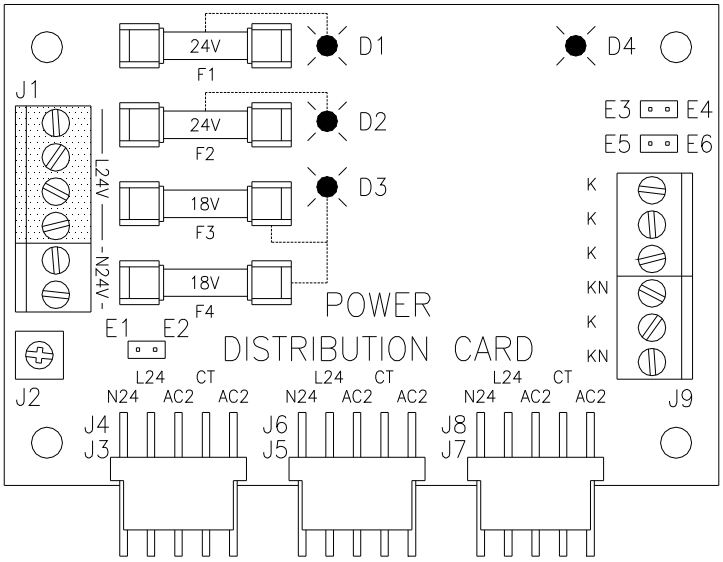
2.2. Power Distribution Card (CDA)

The main function of the power distribution card is to provide both the 18V central tap and 24V supply to the CCEIn, CCEOut, and CHR cards. It also performs the following three essential functions:

- It protects the 18V central tap and 24V supply against surges via the 2A fuses F1-F4. LEDs report the operation status of each fuse.

- It protects the 18V central tap and 24V supply against surges exceeding 25V via the varistors VR1-VR5.

- It protects the 24V supply against high-frequency disturbances exceeding 16KHz via an RC circuit located at the supply inlet.



J3, J4 Input connectors supplying the CDA. They receive 24V AC and 18V central tap from the power supply transformer.

J5-J8 Output connectors for the 24 V AC and 18V central tap power distribution to the CCEIn, CCEOut and CHR cards. There are two output connectors in case the power exceeds the capacity of a single connector.

J1 Screwed terminal block distributing the 24V power and the circuit neutral. The 24V is used as common for the switches and the neutral for the relay common.

J9 Screwed terminal block distributing the 24V power and the circuit neutral, K and KN corresponding respectively to the 24V and the neutral. The power jumpers (Nos. 7 and 8) must be included on the card; otherwise the terminal block has no power.

E1-E2 Jumpers connecting the ground terminal block to the GND.

E3-E4 Jumpers connecting the N24 signal to the KN of the J9 terminal block. It must be included on the card if the J9 terminal block is to be used.

E5-E6 Jumpers connecting the L24 signal to the K of the J9 terminal block. It must be included on the card if the J9 terminal block is to be used.

D4 LED signaling power on the J9 terminal block.

D1 LED signaling power on the circuit protected by the F1 fuse. F1 protects the 24V found on the J5 and J7 connectors.

D2 LED signaling power on the circuit protected by the F2 fuse. F2 protects the 24V found on the J1 and J9 terminal blocks.

D3 LED signaling power on the circuit protected by the F3 fuse. F3 protects the 18V with central tap on the J1 and J9 terminal blocks.

2.3. Lighting Control Card - Input (CCEIn)

As its name suggests, the CCEIn interfaces the control and the external elements; these mainly consist of the various switches and dry contacts from other systems. The CCEIn can be configured in two ways: either with 8 or 16 inputs. The 8-input version is used when low voltage switches are to be connected to the CCEIn, with or without LEDs. In this version, either dry contacts or a combination of contacts and low voltage switches can be used as input signals. The 16-input version is used only with dry contacts (see Chapter 3 for connections and Chapter 5 for programming). The selection of the 8- or 16-input version has to be made upon configuration of the card.

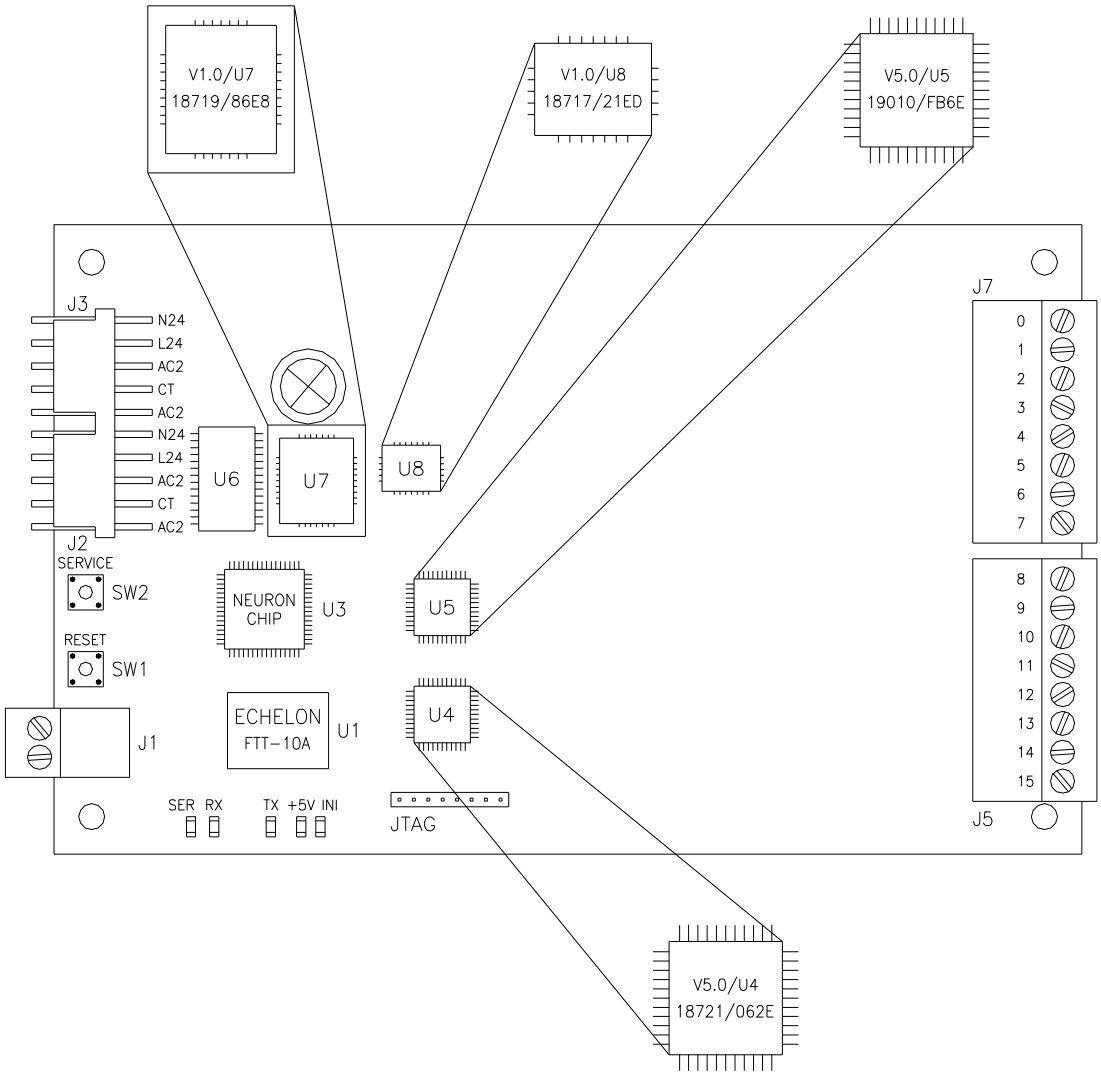


Figure 2-2: Lighting Control Card-Input (CCEIn)

J3 Connector supplying 24V AC (relay supply) and 18VAC with central tap (5V supply) from the CDA or any other card previously connected to the CDA.

J2 Same definition as J3. The power supply (24V and 18V) comes in through the J2 or J3 connector and is redistributed to the other connector to feed the other cards of the panel.

J1 Terminal block used for the connection of the Echelon communication network on the card.

U6 32Kb volatile memory.

U7 64Kb non-volatile memory (programmable).

U8 PAL (programmable).

U3 Echelon ®3150 Neuron Chip ®.

U1 Echelon FTT-10A transceiver for twisted pairs.

U4 CPLD (programmable).

U5 CPLD (programmable).

JTAG CPLD programming connector. For manufacturer's use only.

J7 Terminal block for inputs 0 to 3 when configured in the 8-biased input mode or terminal block for inputs 0 to 7 when configured in the 16 dry-contact-type inputs.

J5 Terminal block for inputs 4 to 7 when configured in the 8 biased input mode or terminal for inputs 8 to 15 when configured with the 16 dry contact-type inputs.

SW2 Service pin switch that prompts the card to transmit its ID number in the network.

SW1 Reset switch for the material reset of the card.

Diagnostic LEDs:

Ser: indicates node status (see the Code chart in the Appendix).
Rx: indicates data reception.
Tx: indicates data transmission.
+5V: indicates 5V power on the card.
Int: indicates even a slight change in status of any card input.

2.4. Lighting Control Card - Output (CCEOut)

The CCEOut controls either 16 two-wire relays or 8 three-wire relays. In the first instance, the model is designed to check the actual state of the relays they activate. This function allows a relay to activate other relays through its own change of state, prompted by a switch that is directly connected to it. To avoid current surges, relays are sequentially activated.

Relay groups are also programmed into this card. These groups can include either resident relays or relays connected to other cards.

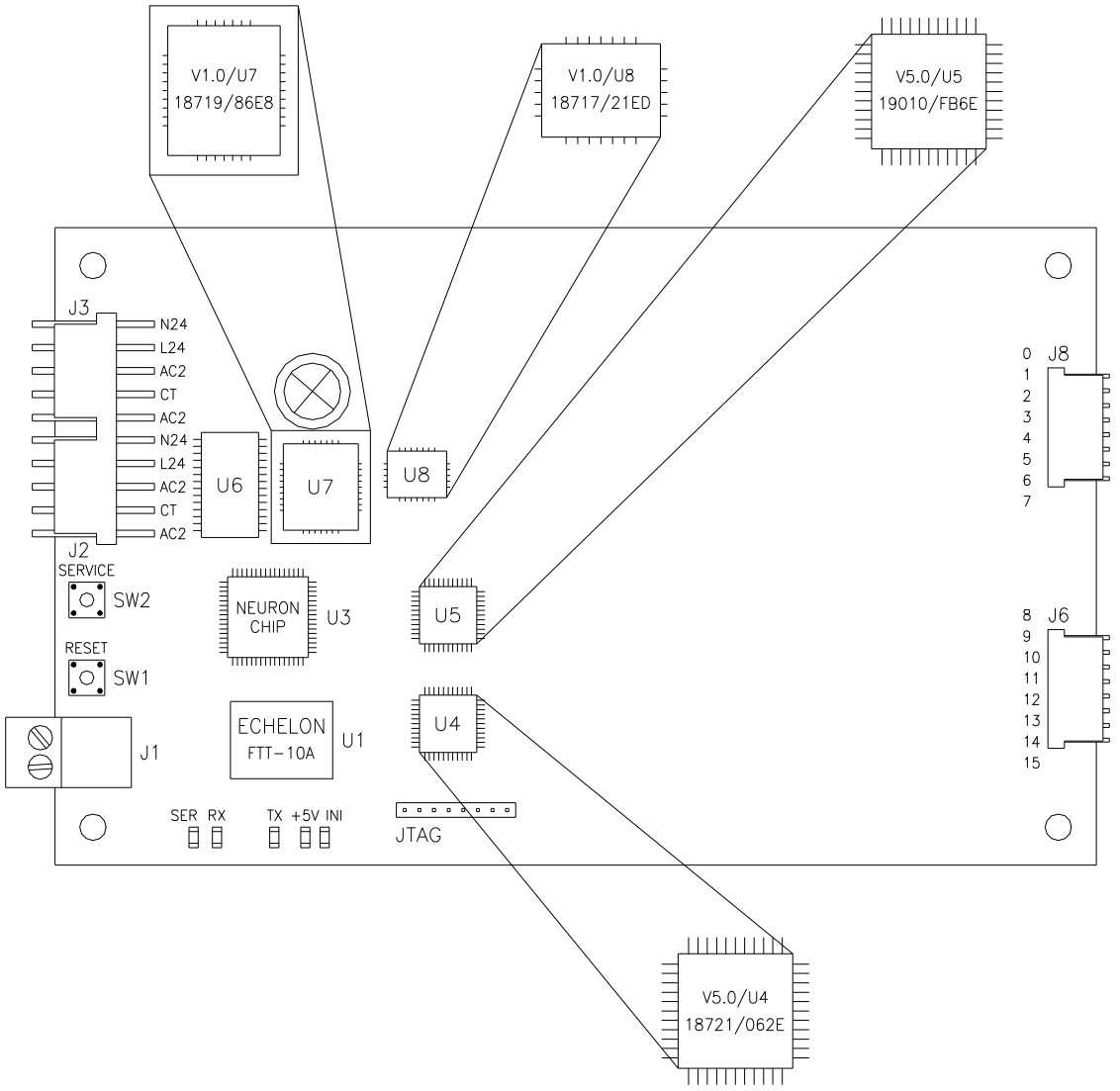


Figure 2-3: Lighting Control Card - output (CCE Out)

J3 Connector supplying 24V AC (relay supply) and 18V AC with central tap (5V supply) from the CDA or any other card previously connected to the CDA.

J2 Same definition as J3. The power supply (24V and 18V) comes in through the J2 or J3 connector and is redistributed to the other connector to feed the other cards of the panel.

J1 Terminal block for the Echelon communication network connection on the card.

U6 32Kb volatile memory.

U7 64Kb non-volatile memory (programmable).

U8 PAL (programmable).

U3 Echelon ®3150 Neuron Chip ®.

U1 Echelon FTT-10A transceiver for twisted pairs.

U4 CPLD (programmable).

U5 CPLD (programmable).

JTAG CPLD Programming connector. For manufacturer's use only.

J8 Connector for inputs 0 to 3 when in output mode for three-wire relays or terminal block for inputs 0 to 7 when in output mode for two-wire relays.

J6 Connector for inputs 4 to 7 when in output mode for three-wire relays or terminal block for inputs 8 to 15 when in output mode for two-wire relays.

SW2 Service pin switch that prompts the card to transmit its ID number to the network.

SW1 Reset switch for the hardware reset of the card.

Diagnostic LEDs:

Ser: indicates node status (see the Code chart in the appendix).
Rx: indicates data reception.
Tx: indicates data transmission.
+5V: indicates 5V power on the card.
Int: indicates even a slight change in status of any card input.

2.5. Network Scheduler Card (CHR)

The CHR card is offered in three versions:

-With node.
-With scheduler and analog-to-digital converter.
-With RS-232, RS-422 and RS 485 serial communication.

These versions are configured by the manufacturer and it is essential to specify the desired version upon placing the order. Each version is detailed below.

The power supply, communication and Neuron chip with memory sections are identical in all three versions. The only difference lies in the options section.

J3 Connector supplying 24V AC (relay supply) and 18V AC with central tap (5V supply) from the CDA or any other card previously connected to the CDA. Since it only redistributes the 24V AC, the CHR does not need this power to operate; it only needs the 18V with central tap that generates the 5V.

J4 Same definition as J3. The power supply (24V and 18V) comes in through the J3 or J4 connector and is redistributed to the other connector to feed the other cards of the panel.

U4 32Kb volatile memory.

U5 64Kb non-volatile memory (programmable).

U8 PAL (programmable).

J1 Terminal block connecting the Echelon communication network to the card.

J2 Terminal block connecting the Echelon communication network to the card.

SW1 Reset switch for the hardware reset of the card.

Diagnostic LEDs:

Ser: indicates node status (see the Code chart in the appendix).
Rx: indicates data reception.
Tx: indicates data transmission.
+5V: indicates the presence of 5V power on the card.
Int: indicates even a slight change in status of any input card.

U3 Echelon ® 3150 Neuron Chip ®.

U1 Echelon FTT-10A transceiver for twisted pairs.

SW2 Service pin switch that prompts the card to transmit its ID number to the network.

2.5.1. Version with node

Assembled with a minimum of parts, this card is used for data acquisition or various logical and mathematical operations. Its easy configuration makes it simple to add a few parts and to program it as a data logger or for any similar functions. With a minimum amount of additional programming, it can be customized to specific customer applications. For more details, please contact a Gentec sales representative.

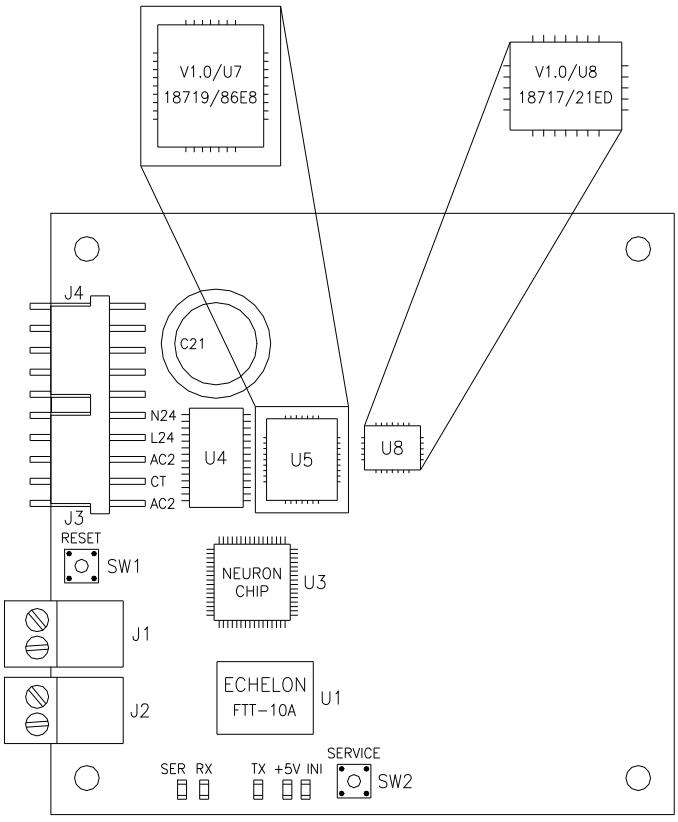


Figure 2-4: Network Scheduler Card (CHR), with node

2.5.2. Version with scheduler and analog-to-digital converter

The function of this card is to manage time throughout the Echelon communication network (via an astronomical clock). It includes two analog-to-digital converters to read, under resistivity mode or under voltage mode, any signal that has a voltage equal to or less than 10V. The Scheduler option requires only one card per communication network. When a number of CHRs are used within the same network, the software resynchronizes each clock. As for the analog-to-digital converter option, it is possible to add any number of cards.

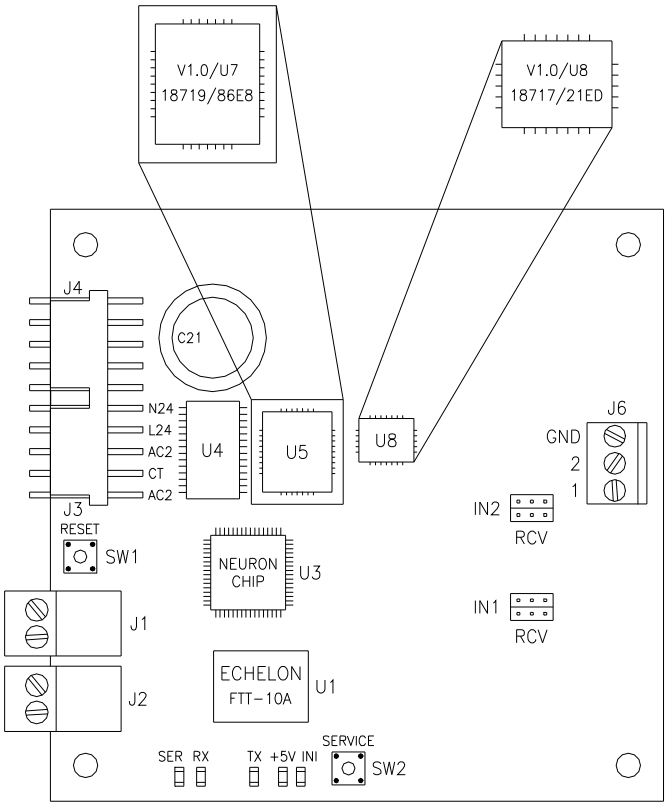


Figure 2-5: Network Scheduler Card (CHR), with scheduler and analog-to-digital converter

J6 Terminal block for the two analog/digital inputs. These inputs can be used in two different modes: in R (resistance) or in V (voltage) mode.

IN2 Configuration connection for the IN2 analog/digital input.

IN1 Configuration connection for the IN1 analog/digital input.

C21 1µF capacitor that supplies the CPU clock function with stored power; this allows correct time keeping even in case of a main power failure in the card for approximately 12 hours.

To program the card either in the resistivity mode or in the voltage mode, configuration jumpers (Nos. 14 and 15 in the diagram) are used for input 2 (IN2) and input 1 (IN1) respectively.

The configuration jumpers are R (resistivity), C (common) and V (voltage). The two jumpers relevant to the selected input must be placed between the C (common) and the requested mode. Note: the two inputs can be configured differently.

The wires must be connected to the J6 terminal block, between the GND terminal block and the selected input (IN1 or IN2).

2.5.3. RS-232, RS-422 and RS485 serial communication version

The CHR in its serial communication version is designed to interface with the following three communication types: RS-232, RS-422 and RS485. The Neuron chip keeps the speed of incoming data down to 4.8 Kbps. However, some components outside the neuron chip allow communication up to 115 Kbps.

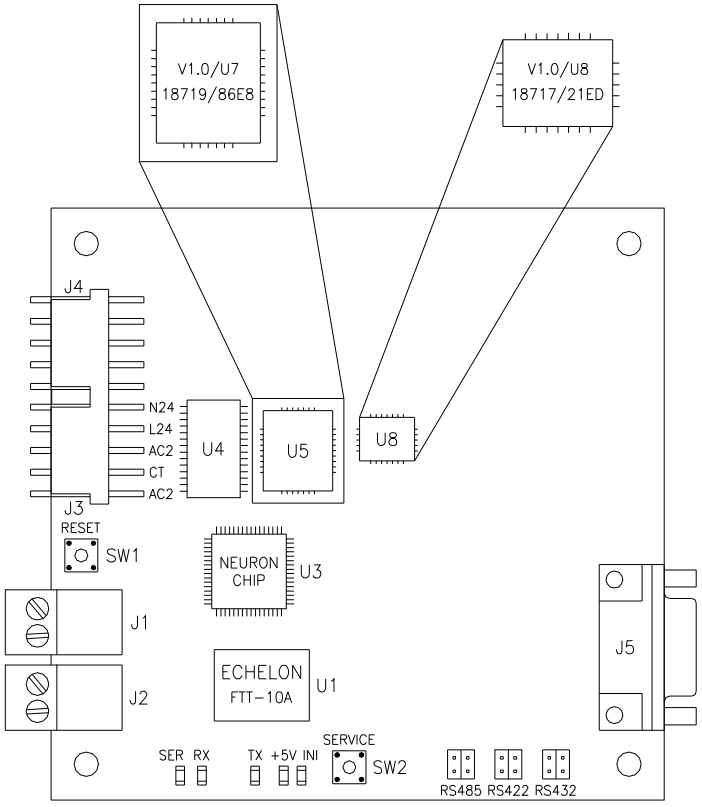


Figure 2-6: Network Scheduler Card (CHR), with serial communication

RS485 Jumper to select the RS-485 communication.

RS422 Jumper to select the RS-422 communication.

RS232 Jumper to select the RS-232 communication.

Note: On the pins 13,14 and 15, the jumpers must be on only one type of communication. Furthermore, the two jumpers must be set to the same type of communication; otherwise the selected communication will not operate adequately.

J5 Connector of the RS-232, RS-422 and RS-485 communication ports. The serial port must be connected as follows:

Contact 1: DIF- Communication RS-422
Contact 2: TX RS-232
Contact 3: RX RS-232
Contact 4: DIF+ RS-485, Incoming RS-422
Contact 5: GND
Contact 6: DIF- RS-485, Incoming RS-422
Contact 7: CTS RS-232
Contact 8: RTS RS-232
Contact 9: DIF+ Communication RS-422

2.6. Identification of circuits and programmable components

Gentec follows the following ID code in labeling the programmable parts and the finished products:

- Label on programmable components:

V6.1/U5
19010/21C3

V6.1: program version number

U5: location of the component on the circuit.

19010: design list number.

21C3: checksum of the programming software, to check whether the component has been programmed with the right software.

- Circuit labels

LM : 100-18429-01
Revision : B
Serial Number: 143963

LM: Bill of material number.

Revision: Bill of material revision number

Serial Number: Card number assigned by Gentec to keep track of the production date and to monitor the card history.

3. CONNECTION OF ELECTRONIC CIRCUITS

3.1. Power Distribution Card (CDA)

The CDA is supplied with 24V and 18V ct. The transformer is connected to connectors J3 and J4. Power is fuse- and varistor-protected and is distributed to CCEIn, CCEOut and CHR cards through connectors J5-J6 and J7-J8, both sets having the same function. The connectors are paired to avoid a power surge on a single connector.

The terminal block J1 distributes the L24V and N24V, as does the terminal block J9. By convention, the terminal block J1 controls the connections inside the panel, while the terminal block J9 controls those outside the panel. The jumpers E3-E4 and E5-E6 are necessary to make connections operational on the terminal block J9. Once the jumpers are set, the LED D4 is on.

The terminal block J2 connects the grounding (MALT) of the power card to the grounding (MALT) of the panel mounting plate, when the fixing point under the terminal block J2 is insulated from the panel mounting plate.

Note: The grounding MALT of the CDA is usually linked with a screw and a metal spacer to the mounting plate at the fixing point located under the terminal block J2.

3.2. Eight-input control card

3.2.1. Connection of the power supply

The power supply is connected through two connectors. By convention, the power input is connected to the connector J3 and the output is connected to the terminal block J2, so that the cards are connected in daisy chain. The power supply wires are No. 16 and the cables are all assembled in such a way that contacts correspond at each end of the cable.

3.2.2. Connection of the communication network

The communication network must be connected to the terminal block J1; there is no polarity in the wire connection. The wire should be twisted and ground-shielded. For more details, see the Cable specification section.

3.2.3. Connection of switches on an eight-input card

Each input includes two terminal screws. Screws 0 and 1 are for input 1; screws 2 and 3, for input 2; screws 4 and 5, for input 3; screws 6 and 7 for input 4; screws 8 and 9 for input 5; screws 10 and 11 for input 6; screws 12 and 13 for input 7; and screws 14 and 15, for input 8. All the terminal blocks with even numbers give an ON signal while the terminal blocks with odd numbers give an OFF signal. The common of the switches must always be connected to the CDA at the 24V line, on the terminal block J9, at terminal K. There are five possible types of connections:

- Low voltage double-pole switch
- Maintained switch
- Momentary or maintained switch with ON control
- Momentary or maintained switch with OFF control
- Momentary switch with ON-OFF control.

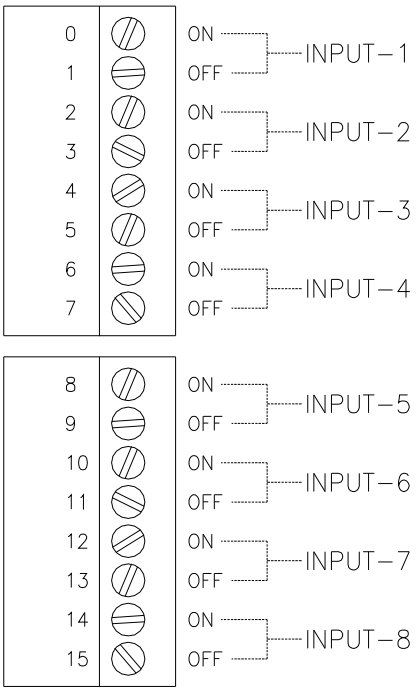


Figure 3-1: Connection of switches on an eight-input card

3.2.3.1. Low voltage double-pole switch

To connect the double-pole switches, the odd and the even screws of the input to be used must be linked together; the wire from the switch must be connected to one of the terminal screws. The LEDs will signal the feedback state of the switch: a green LED means that the switch is OFF; while the red LED means that the switch is ON. However, it is possible to reverse them through a command at the workstation, so that the red LED signals OFF and the green LED signals ON.

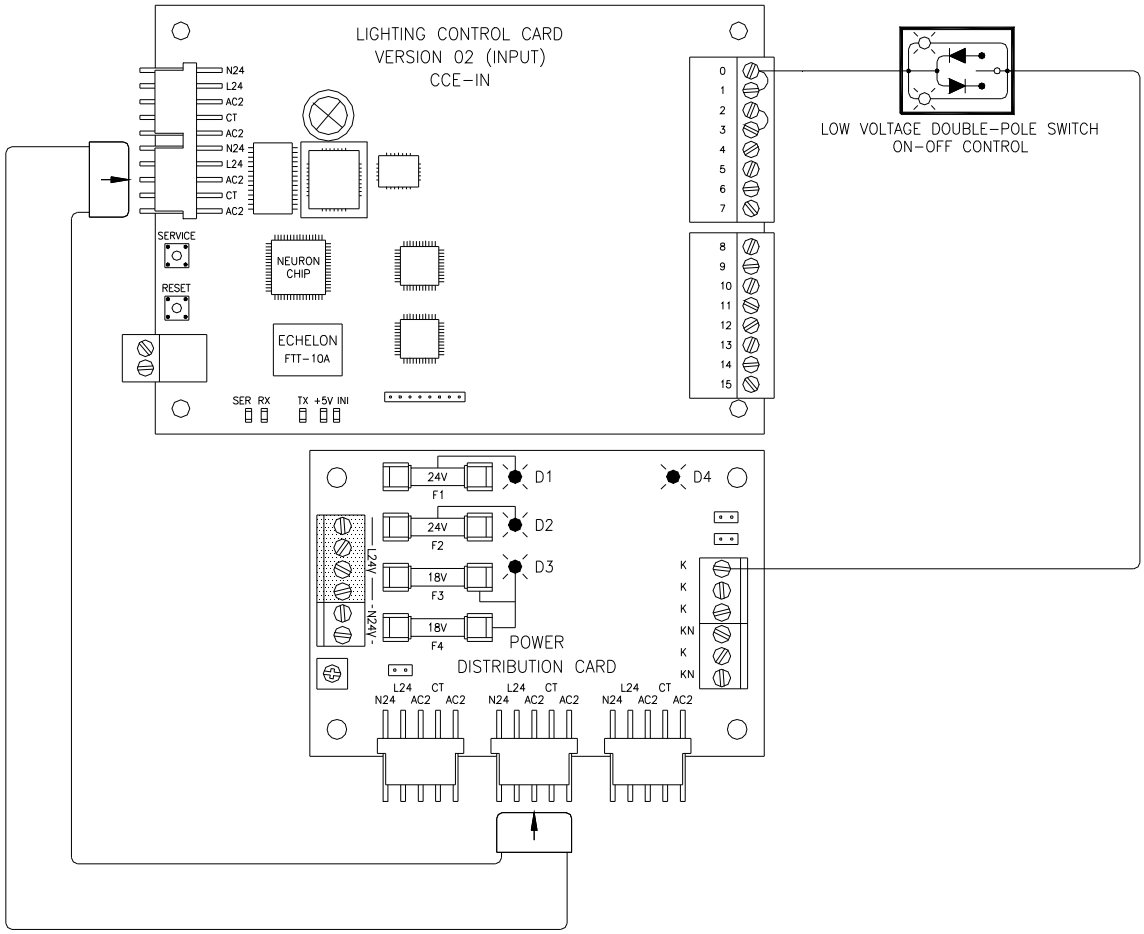


FIGURE 3-2: LOW VOLTAGE DOUBLE-POLE SWITCH

3.2.3.2. Maintained switch with ON-OFF control

For the dry contact switch with ON-OFF control, the even and odd screws of the input must be linked together and the wire from the switch must be connected to either one of the terminal screws.

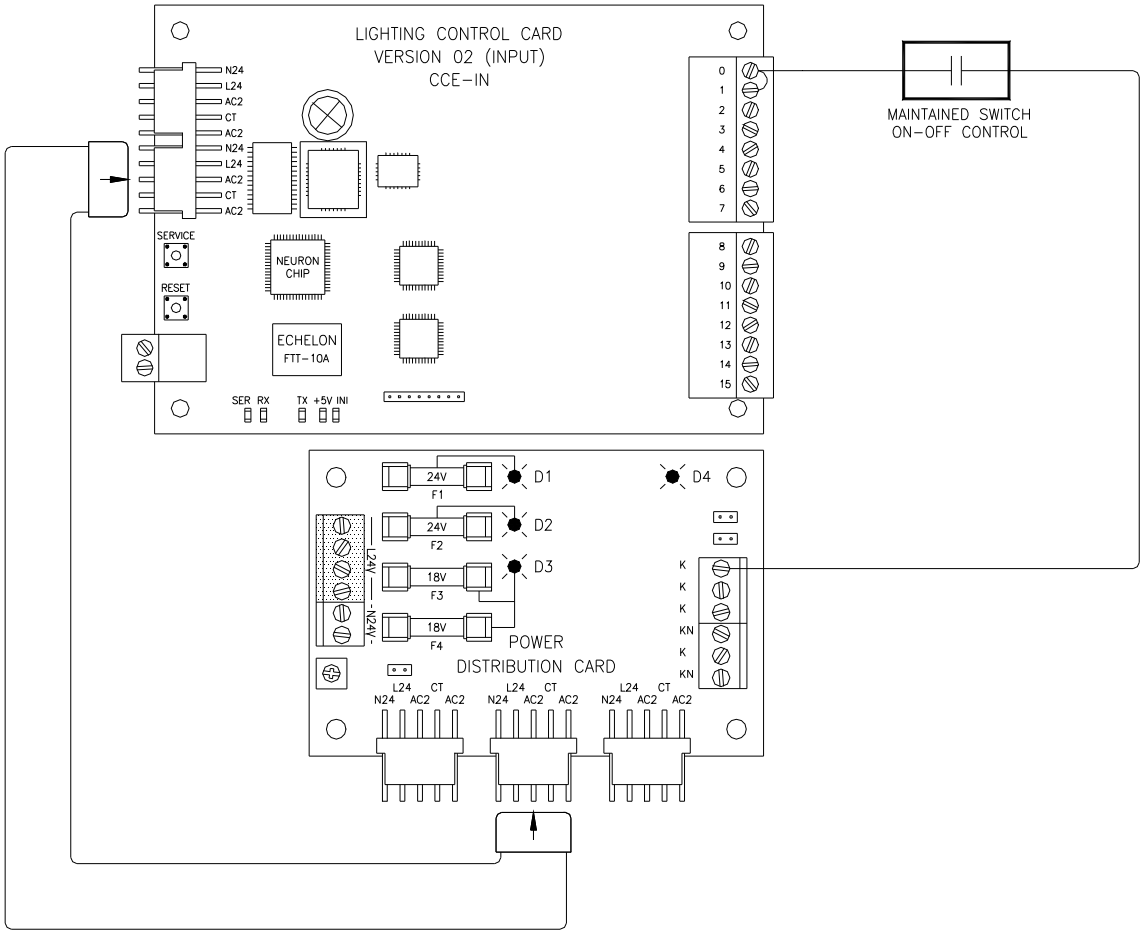


Figure 3-3: Maintained switch with ON-OFF control

3.2.3.3. Momentary or maintained switch with ON control

For the dry contact switch with ON control, the wire from the switch must be connected to the even screw. This way, the switch acknowledges only the ON action.

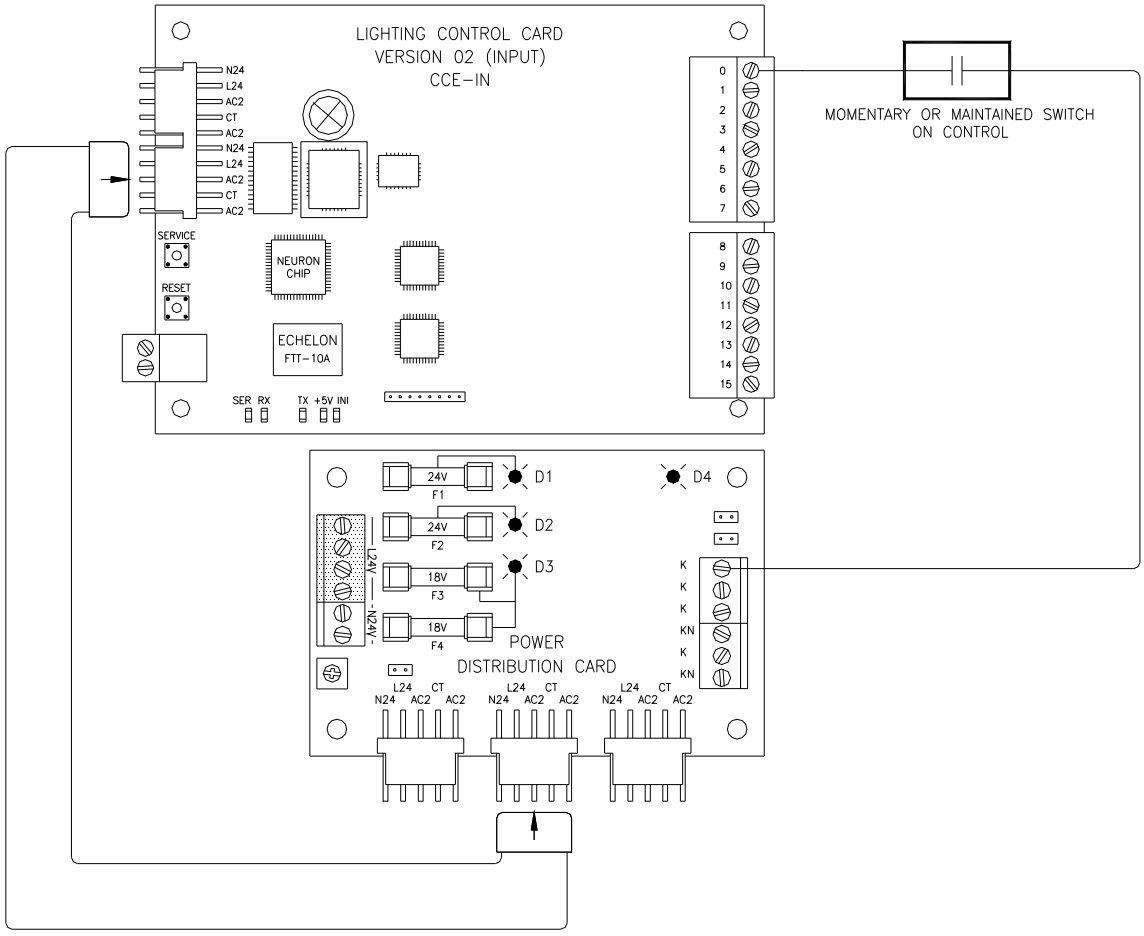


Figure 3-4: Momentary or maintained switch with ON control

3.2.3.4. Momentary or maintained switch with OFF control

For the dry contact switch with OFF control, the wire from the switch must be connected to the odd screw. This way, the switch acknowledges only the OFF action.

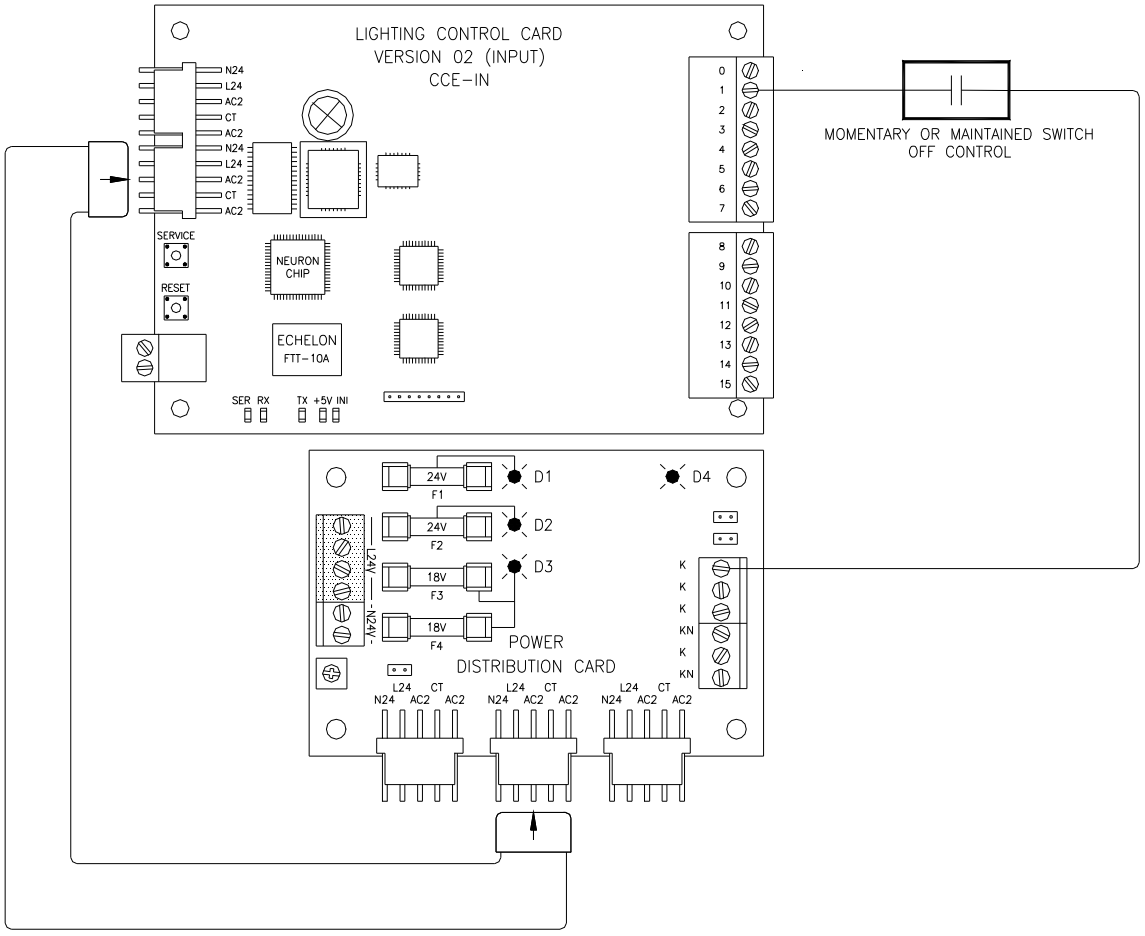


Figure 3-5: Momentary or maintained switch with ON control

3.2.3.5. Momentary switch with ON-OFF control

It is possible to connect two momentary-type switches to the same input: the switch that activates the ON control must be connected to the even screw and the switch that activates the OFF control must be connected to the odd screw. However, this type of connection can generate problems and we do not recommend its use.

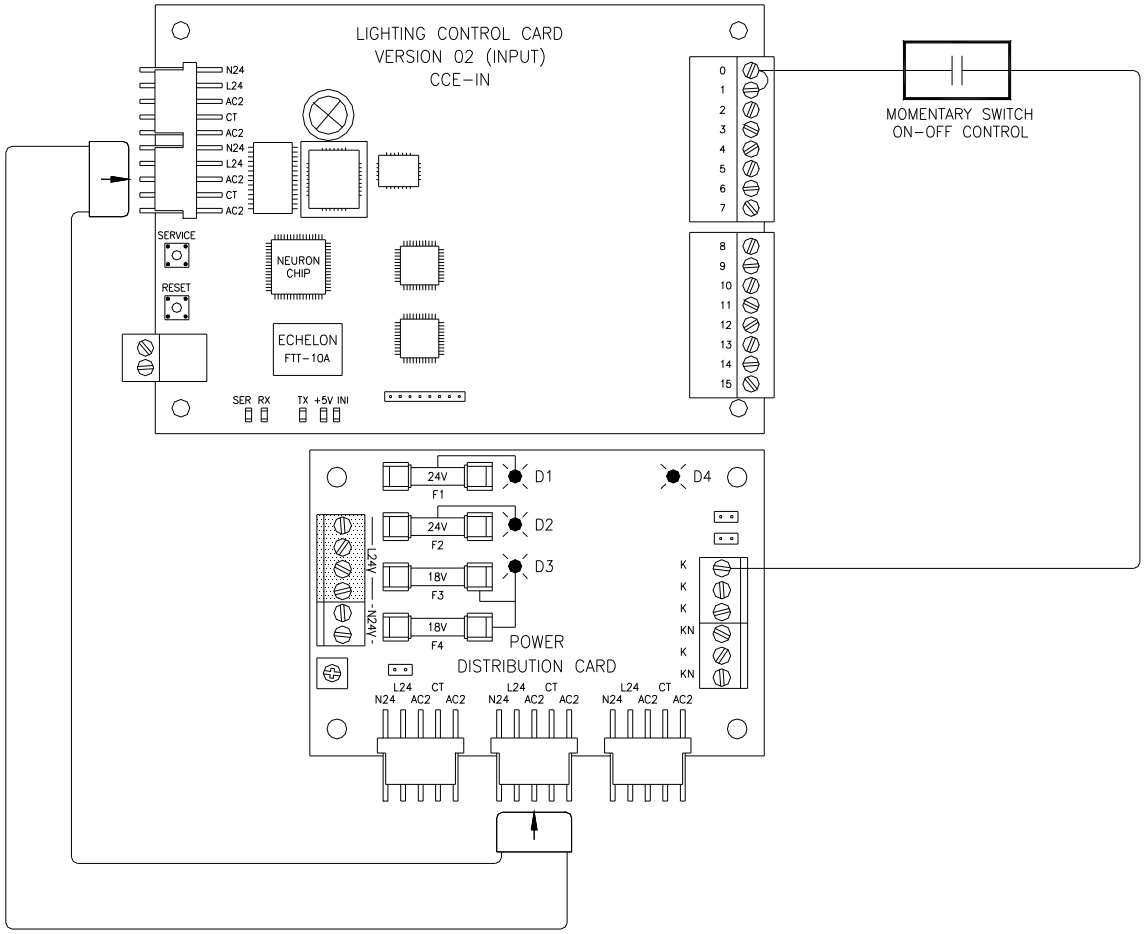


Figure 3-6: Momentary switch with ON-OFF control

3.3. Sixteen-input control card

Each screw in the terminal block represents an input and there is only one type of connection possible. A maintained dry contact switch must be connected to a contact on the corresponding input and the second contact must be linked to the CDA card, at the 24V power supply, on the terminal block J9, terminal K.

3.4. Control card for two-wire relays

3.4.1. Connection of the power supply

The power supply is connected through two connectors. By convention, the power input and output are respectively connected to connectors J3 and J2, so that the cards are in daisy chain. The power supply wires are No. 16 and the cables are all assembled in such a way that contacts correspond at each end of the cable.

3.4.2. Connection of the communication network

The communication network must be connected to the terminal block J1; there is no polarity in the wire connection. The wire should be twisted and ground-shielded. For more details, see the cable specification section.

3.4.3. Connection of 2-wire relays

There are 16 outputs available for the 2-wire relays (Aromat). The red contact must be connected to an output terminal block from 1 to 16 and the blue contact must be connected to the CDA card, at the 24V neutral on the terminal block J9, terminal KN.

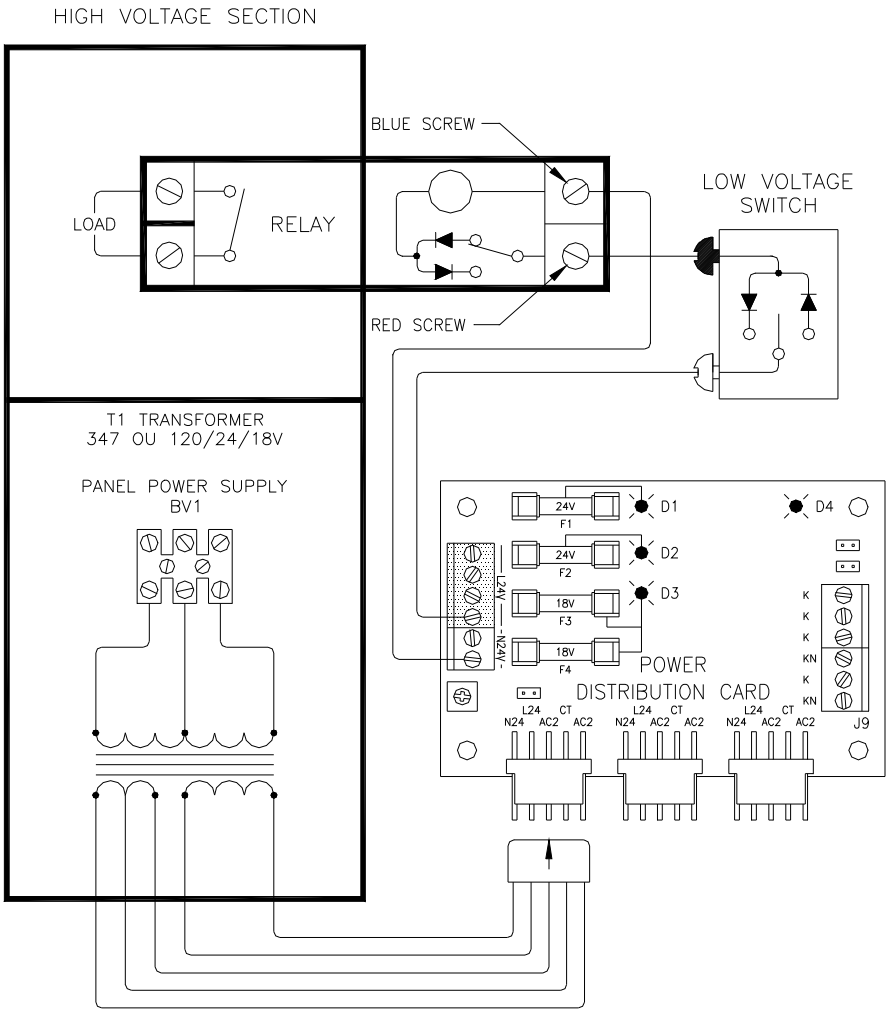


Figure 3-7: Wiring diagram for two-wire relay

3.5.Control card for three-wire relays

The connection of the power supply and the communication network is done in the same way as for the two-wire relay.

There are 8 outputs available for the three-wire type relays (GE or other). Screws 0 and 1 are for output 1; screws 2 and 3, for output 2; screws 4 and 5, for output 3; screws 6 and 7 for output 4; screws 8 and 9 for output 5; screws 10 and 11 for output 6; screws 12 and 13 for output 7; and screws 14 and 15, for output 8. All the terminal blocks with even numbers give an ON signal while the terminal blocks with odd numbers give an OFF signal. The common is connected to the CDA at the 24V neutral, on the terminal block J9, terminal KN.

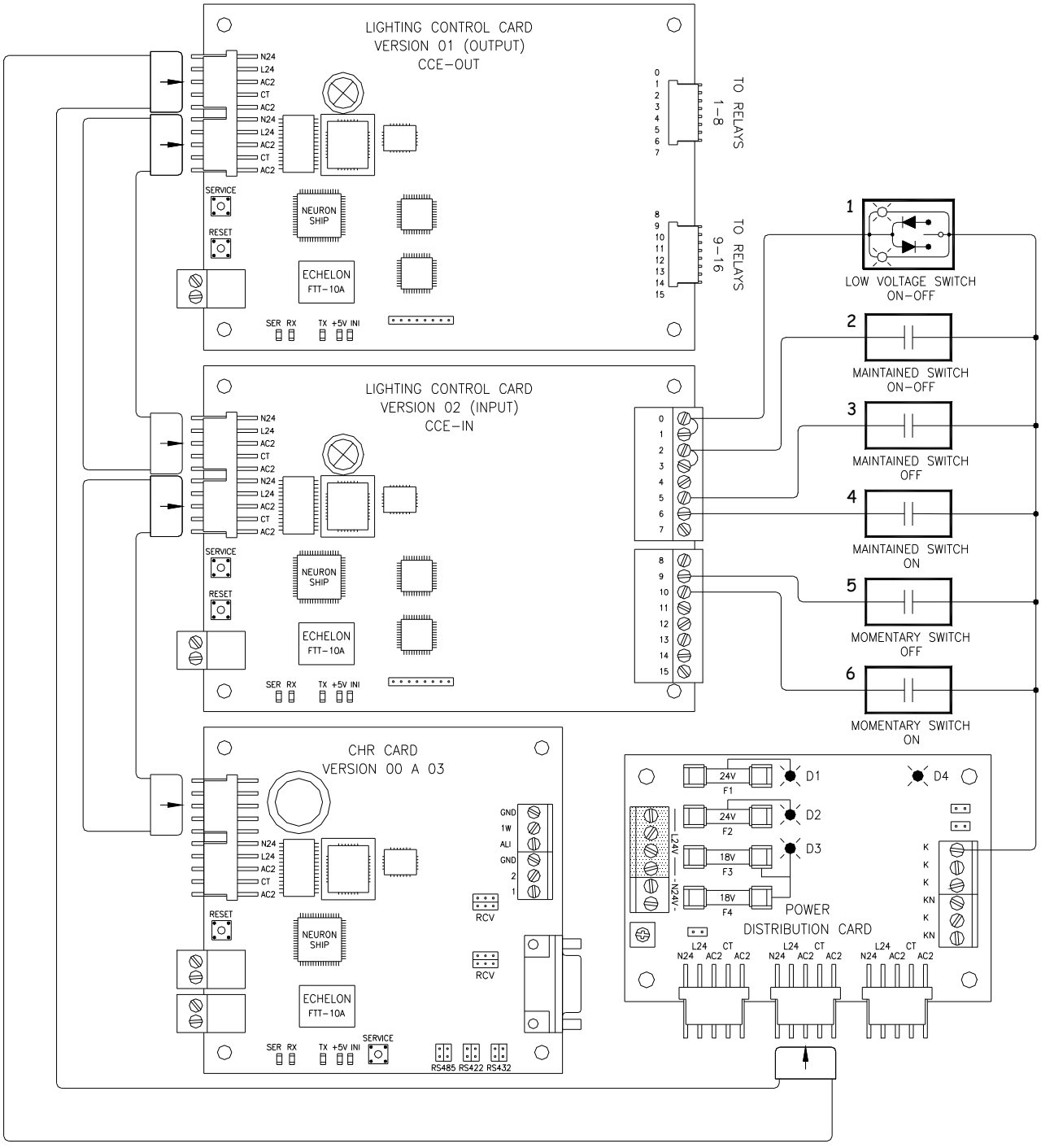


Figure 3-8: Interconnection diagram

4. COMMUNICATION NETWORK

4.1. Introduction to network types FTT10A

The FTT-10A Free Topology Transceiver makes it possible to add a LonWorks transceiver to a neuron chip in any control system. As a substitute to the usual FTT-10, the FTT-10A is connected without polarity. As it can be connected to various types of networks (bus, star and mixed), it makes installation easier, saving time and money. One of the advantages of this transceiver lies in the fact that it disregards wiring and node location constraints and thus simplifies network extensions.

The FTT-10A transceiver is an insulation transformer that includes a 78 Kbps Manchester differential communication protocol. The network considers it as being of high impedance when power is not supplied and does not generate any interference in the network in case of power failure.

The FTT-10A transceiver is compatible with the Echelon LPT-10 transceiver and can interface with any other transceiver through a single twisted-wire pair.

4.2. Types of topology

A conventional control system that uses the bus-wiring topology (like the topology prevalent in the RS-485) actually represents a network of sensors and interconnected output controls linked through a shielded twisted cable. Each checkpoint must be linked to the bus-topology network in order to reduce electric reflection and insure stability in communication. This type of topology generates higher installation and maintenance costs, because the star topology cannot be used, since all the points must be connected directly to the main bus.

The free-topology communication system used by Echelon FTT-10A not only greatly simplifies eventual changes, but is also the most cost-efficient solution for installation and maintenance. This topology proves to be less expensive and more versatile than any other type.

With this architecture, every point can be controlled without restriction on the topology to be used. The power is supplied at every point by a local 5V DC. Here is an example of free topology:

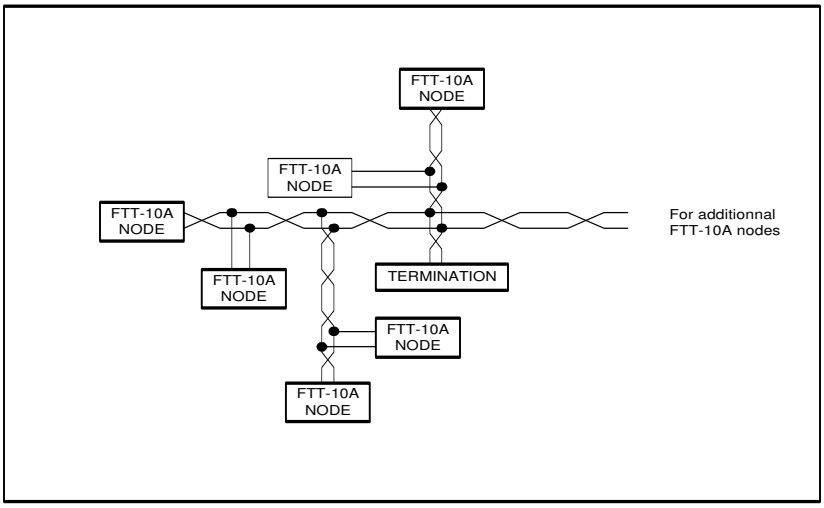


Figure 4-1: Free topology

Unlike other communication wiring systems, the FTT-10A resorts to a free topology that supports other types of topology: star, single termination bus and dual termination bus. It can be included in existing or new projects. This system offers many benefits. First, the installer is free to choose the type of topology that is best adapted to the current application; this reduces the need for long-term planning and allows last-minute changes. Secondly, free topology does not require additional training, which proves to be useful when installers are used to a specific communication system. Thirdly, replacing the system within an existing communication network requires a minimum of additional wiring. Finally, free topology allows FTT-10A to accept an extension through a simple connection to the existing system, at the most convenient location. The time involved and the costs incurred to expand the system are greatly reduced.

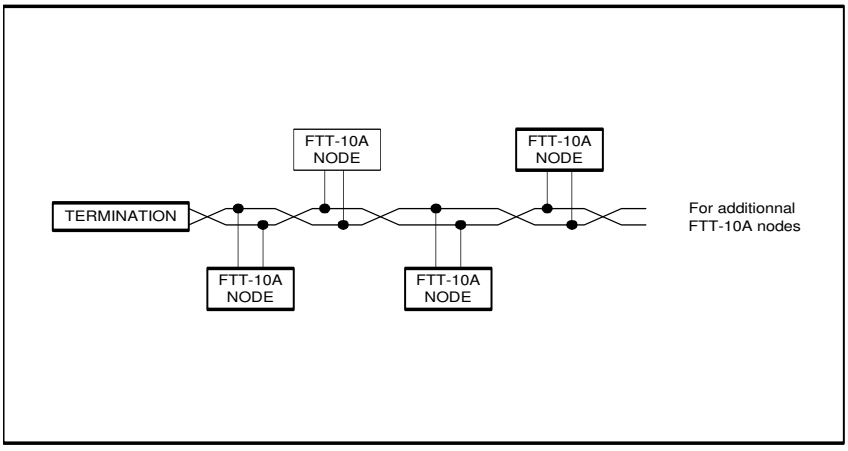


Figure 4-2: Single termination bus topology

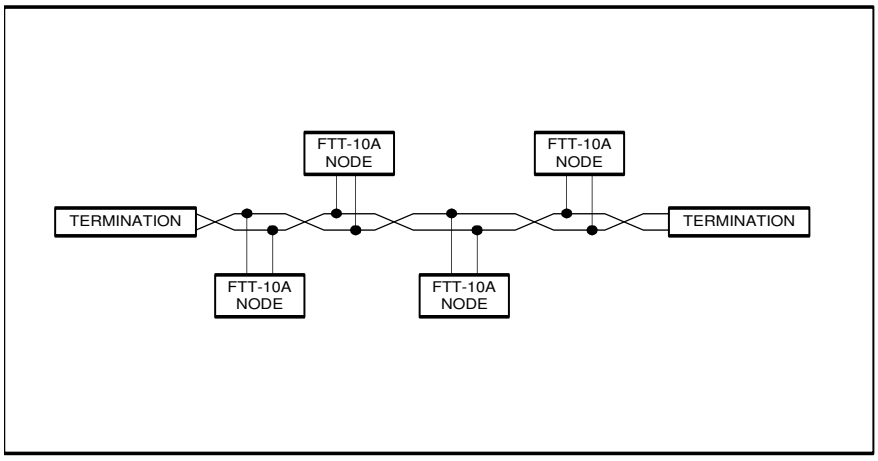


Figure 4-3: Dual termination bus topology

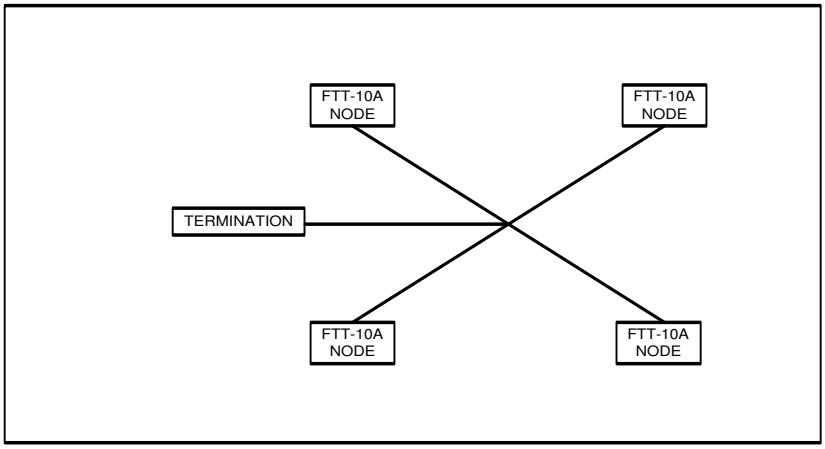


Figure 4-4: Star topology

Extending the system can also be simplified in another way. Each FTT-10A transceiver includes a multiple repetition function. When a network segment grows and exceeds the maximum number of transceivers or the maximum cable distance, an additional segment can be installed by interconnecting two FTT-10As that use this multiple repetition function. These repeater FTT-10As will transfer the Lontalk data between the two segments in doubling the maximum capacity of the transceiver and the maximum cable distance on this segment. Thanks to this repeater function, the FTT-10A network can grow according to new needs, without visible changes to the existing system and without the need for a special interface system.

Note: A single network system cannot receive more than one repeater. If the amount of data is too bulky, it is recommended to use a LonWorks router for transferring data.

4.3. System specification

- Up to 64 FTT-10A transceivers are allowed per segment.
- It is possible to use LPT-10 transceivers and FTT-10As on the same segment, but there are restrictions, especially for distance.
- The average temperature of the cable must not exceed +55^{o} C; however, a network segment can stand temperatures as high as +85^{o} C.
- It is essential to separate communication cables from high voltage cables.

4.4. Cable specification

The following three types of cable recommended by Echelon are widely available on the market.

1. TIA568A (Telecommunications Industry Association) is a Category 5 cable (24 AWG/0.51 mm), which is easily found.
2. NEMA (National Electrical Manufacturers Association) level IV (22 AWG/ 0.65 mm) is available in many versions: solid or multi-strand, with one or two pairs of wires per cable, shielded or not, plenum or PVC.
3. Cable no. 16 AWG/1.33mm such as Belden 85102 or Belden 8471.

Chart 4-1
Dual Termination Bus Topology

	Maximum bus length	Unit
Belden 85102	2 700	meters
Belden 8471	2 700	meters
Level 4, 22AWG	1 400	meters
JY(St) y 2x2x0.8	900	meters
TIA Category 5	900	meters

Chart 4-2
Free Topology

	Maximum node-to-node distance	Total cable length	Unit
Belden 85102	500	500	meters
Belden 8471	400	500	meters
Level 4, 22AWG	400	500	meters
JY(St) y 2x2x0.8	320	500	meters
TIA Category 5	250	900	meters

The following two conditions must be met for the adequate operation of a communication network in free topology:

- The distance between any transceiver and the other transceivers, and the line termination (including the LPI-10 termination, if any) must not exceed the maximum node-to-node distance.
- If there are many segments, calculations must be based on the longest segment. The total maximum cable length is the total cable length of any single segment.

4.5. Resistance at line terminator and grounding of the shielded cable

For better communication performance, TP/FT-10 networks require a resistance at the line terminator. The type of termination depends on the type of cable used, whether it is shielded or not. Free topology and bus topology do not use terminations in the same way. The next section explains in detail how to use them.

The free topology network requires only one termination, which can be installed anywhere on the segment. The following two terminations can be used:

- A RC circuit with a RA 52.3R 1 %,1/8 W
- A LPI-10 (Link Power Interface) with a configuration jumper set to “1 CPLR“.

As its name suggests, the dual termination bus topology network must include a termination at each end of the network. The following two terminations can be used:

- A RC circuit with a RA 105R 1 %,1/8 W.
- A LPI-10 (Link Power Interface) with two configuration jumpers set to “ 2 CPLR“.

Currently, only one LPI-10 interface per segment is supported. The LPI-10 has the two terminations needed. All the others must be RC type terminations.

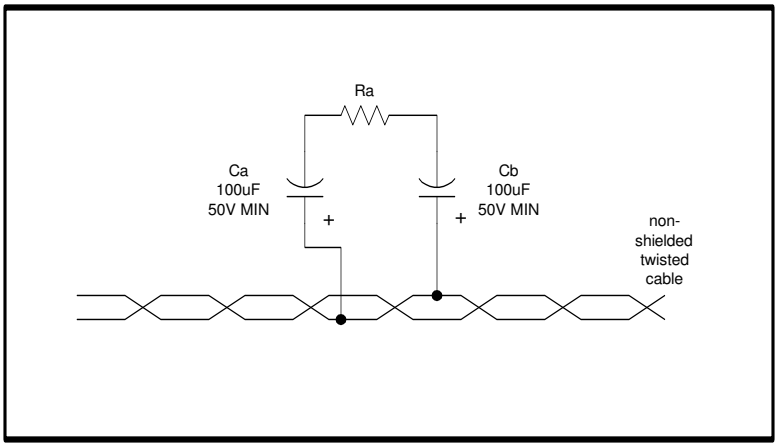


Figure 4-5: Typical termination of a network with twisted wire

Notes:

- Ca and Cb are usually of the electrolytic aluminum type, to increase their life in case of electrostatic discharge. The polarity must be complied with.
- Ca and Cb are needed to link the power networks and to meet LonMark connection requirements.

When a shielded stranded-wire pair is used, a termination is essential and the shield must be connected to the ground.

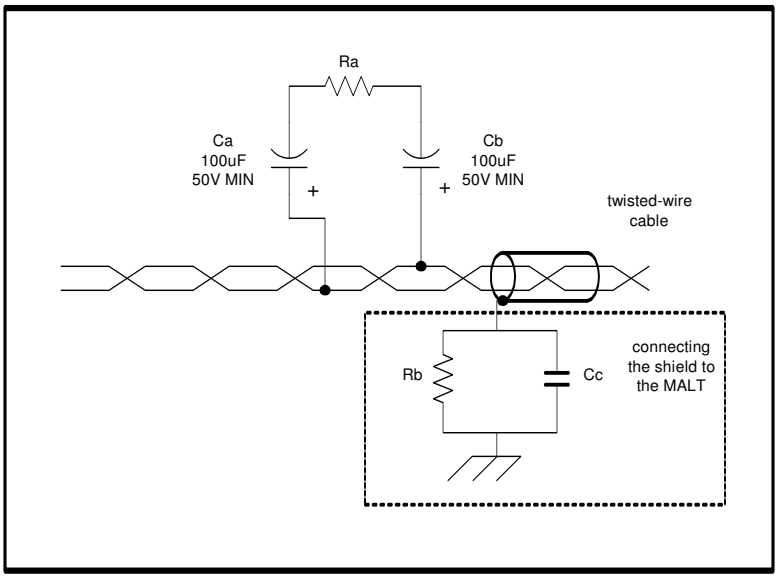


Figure 4-6: Connecting the shield to the ground

The cable shield must be grounded through a capacitor. A high-value resistance must also be placed in parallel to deflect static charges to the shield.

Connecting the shield to the ground through a capacitor, instead of grounding it directly avoids getting DC voltage or 50/60Hz interferences on the cable shield. Typical values of Rb and Cc are as follows:

Cc = 0.1µF, 10%, metallized polyester, ≥100V

Rb = 470K, ¼W, ±5%

The shielded cable must be grounded at least at one point per segment or, ideally, at every node. Grounding the shield at every node allows reducing 50/60Hz variations on the cable.

5. OPERATION AND PROGRAMMING OF THE CONSOLE

5.1. Installing the console

Minimum system requirements:

1. Windows 9x/ME, Windows 2000, Windows XP or Windows NT 4.0 (SP3 or higher).
2. Pentium 200MHz or higher.
3. 32Mb of RAM.
4. 150 MB or more of free space on hard disk.
5. CD-ROM drive.

Installing the software:

The complete Kameleon package installation requires a few software components. The installation application (setup.exe) takes care of the components installation sequence while keeping user intervention to a minimum.

- Insert the Kameleon CD into the CD-ROM drive.
- With Windows Explorer or any similar tool, go to the CD-ROM drive root and start the Setup.EXE application (double-click on the icon).
- Choose the Kameleon setup and operation language.
- Click on a few Next and choose the destination folder.

Here is a list of all the software components installed by Setup with related instructions. Some components require to restart the computer; **WAIT UNTIL THE END OF THE SETUP TO RESTART THE COMPUTER.**

1. LNS Server 3.08

- Follow the instructions.
- Upon installing, always keep the most recent files when asked this question.

2. Network interface

The LonWorks network interface is used for communication between the computer and the Echelon communication network.

- Follow the instructions.
- To all DOS related questions (if any), answer NO.
- **DO NOT RESTART THE COMPUTER** at this point.

3. Hardware Key

The Kameleon software is copy protected by a hardware key that is connected to the parallel port and must be present when Kameleon starts.

- Follow the instructions.
- **DO NOT RESTART THE COMPUTER** at this point.

4. Kameleon software

- All files are copied automatically.
- **THE COMPUTER CAN BE RESTARTED**.

5.2. Access codes

The four levels of access codes are listed below by order of appearance in the window and by ascending order of priority.

View Only: This level gives access to graphic pages but does not allow editing; it is a read-only access.

Operator: The operator can only access graphic pages but cannot move or add objects to them or create or edit databases. However, the operator can use the buttons on the graphic pages and can edit all the available utility programs (such as schedule changes, warnings and time on extension) by selecting an object in a graphic page.

Manager: The manager has access to all the console commands, except the one assigning the “Administrator” access code password.

Administrator: The administrator has access to all the console commands, without exception. This is the only level where all access code passwords can be created.

Please note that only one password is available per level; therefore, if many users share the same level, they also share the password.

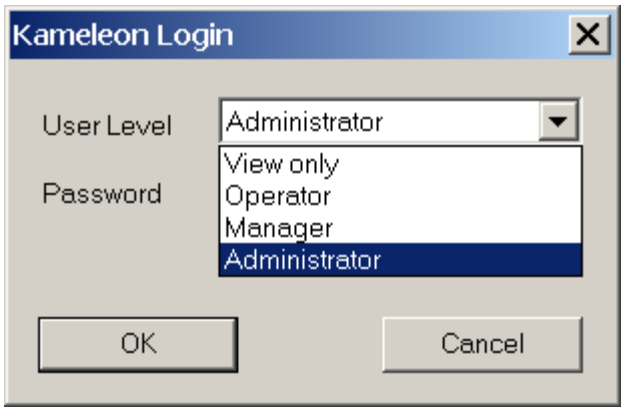
When first installed, all access codes (passwords) are set to the same value: “gentec”.

Important: The password is made up of 1 to 8 alphanumeric characters. The console accepts symbols and punctuation marks, but it is strongly recommended not to use them, since the console may not be able to recognize them following a change in the keyboard configuration. The password is case-sensitive.

5.3. Starting the program

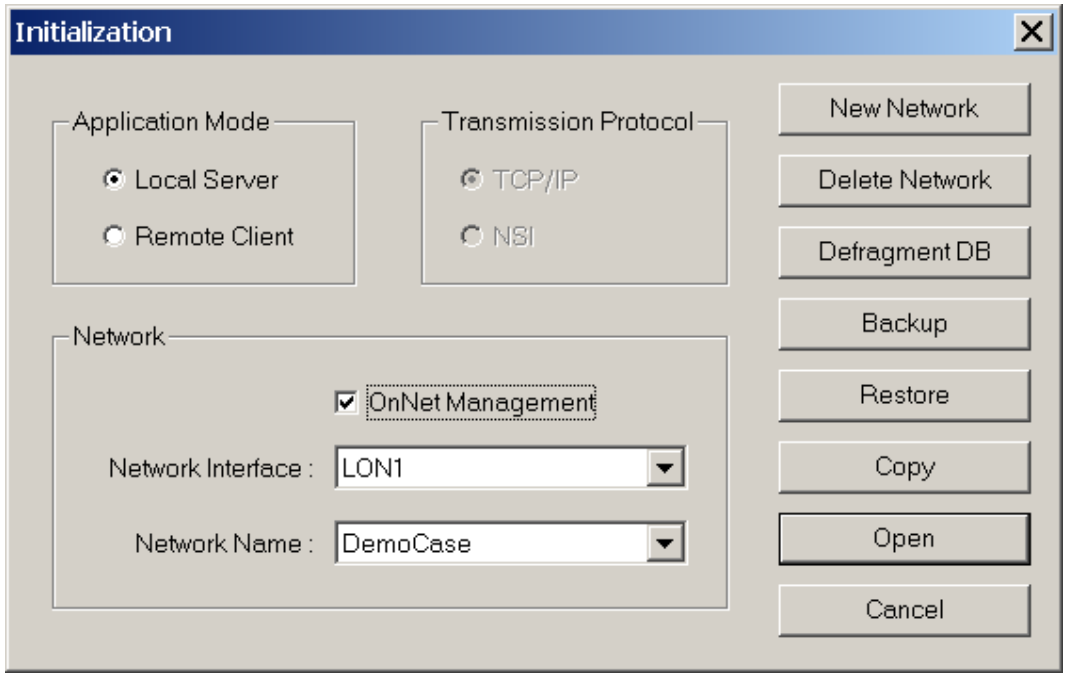
Before opening the console, make sure that the network interface is operating and connected. Then,

- From the **Start** menu, go to “\Programs\Gentec“.
- Launch the “Kameleon“ application.
- A **Password** window pops up. Select your access level and enter your access code. If it is valid, an **Initialization** window opens, with many options; if not valid, this window is open until you enter a valid password or you click Cancel.



5.4. Database

Upon opening the console and having entered the password, the **Initialization** window opens, where it is possible to create, to delete, to defragment, to open, to backup, to restore or to copy a database. With this window, the computer can be placed in the **Local Server** or **Remote client** mode, and the **OnNet Management** option (valid only in **Local Server** mode) can be selected.



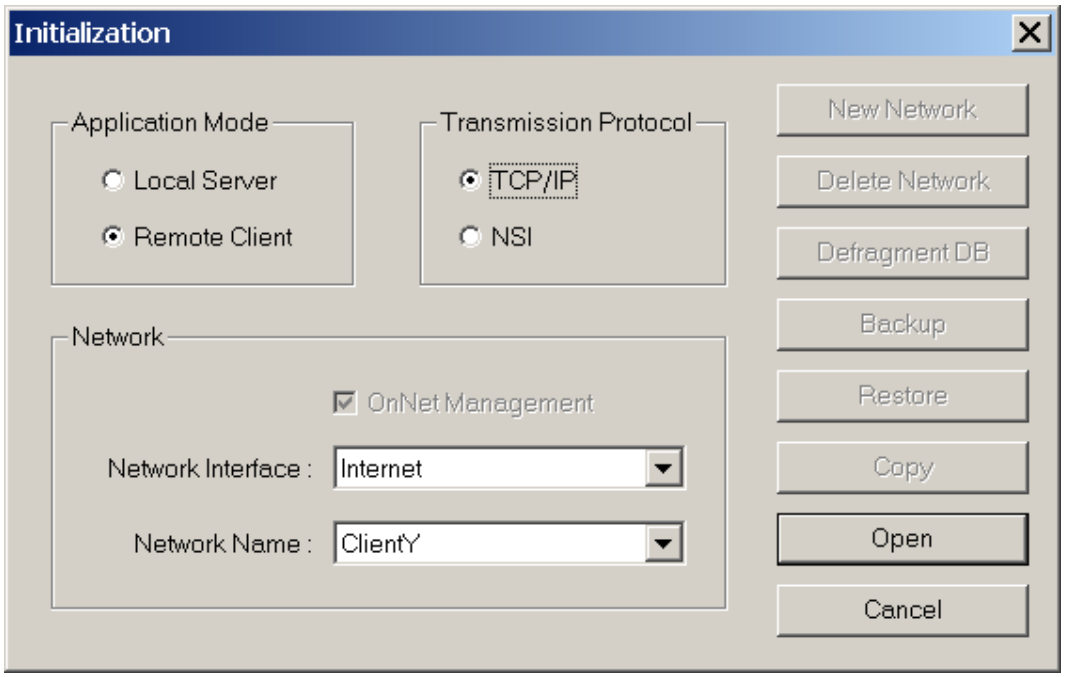
5.4.1. Selecting the application mode

If the database resides in the computer, the **Local Server** mode must be selected. The various possible actions are: create, open, delete, defragment, backup, restore and copy the database. Before clicking one of these, make sure you have the right network interface. As default value, the console selects the first interface that is on your computer; of course, if there is more than one interface, you should specify which one you want.

With the **OnNet Management** option selected, you modify interactively both the database and the network. When 'offnet' (OnNet Management not selected), you modify the database without being connected to the network. The modifications made while 'offnet' are kept in the database and are applied to the network only when the database is next open 'onnet'.

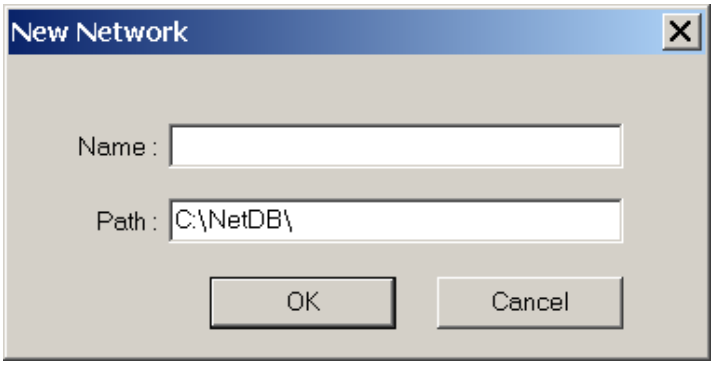
From a client computer environment, the **Remote Client** mode must be selected. As the server database must provide the information, the process is longer and some functions cannot be accessible from this control unit.

In the **Remote Client** mode, two different communication protocols may be used and must be selected in the **Transport Option** section. These are the TCP/IP and NSI (Network Services Interface) protocols. The first uses the Ethernet communication network while the latter uses the Echelon network. In this mode, only opening the database is possible. It is not recommended to install, replace or delete devices. Only the database created on the server can be opened.



5.4.2. Creating a database

To create a database, click **New Network** and enter the name of the new database.



5.4.3. Deleting a database

To delete a database, select the database to be deleted from the **Network Name** field and click **Delete Network**. Deleting a database does not affect its commissioned devices. The network is still working but all modifications are impossible.

5.4.4. Defragmenting a database

To defragment a database, select the database to be defragmented from the **Network Name** field and click **Defragment DB**. This can be done after several changes have been made to the database; though not compulsory, it optimizes the database query process.

Note: It is recommended to backup the original database before defragmenting.

5.4.5. Backup a database

To backup a database, select the database to be backed up from the **Network Name** field and click **Backup**. The user is then prompted to select a path and enter a file name that will contain the compressed database. The default path (folder) is set to “C:\NetDB\Backup” and the database name is used as the file name (with the .ZIP extension).

5.4.6. Restore a database

To restore a database, click on **Restore**. The user is prompted to select a .ZIP file containing the compressed database to restore. If the database already exists, Kameleon asks to overwrite it, or else it creates a new database.

Note: Only backup (.zip) files created by Kameleon (5.4.5) can be restored.

5.4.7. Copy a database

To copy an existing database, select the database to be copied from the **Network Name** field and click **Copy**. The user is then prompted to enter a new database name.

5.4.8. Opening a database

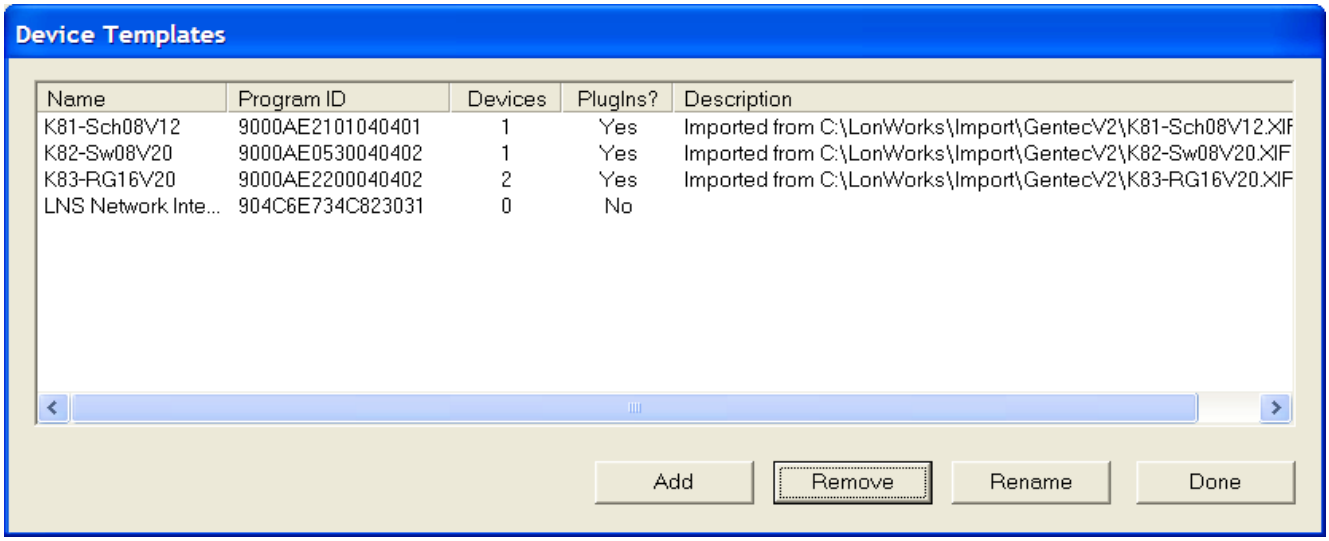
To open a database, select the database to be opened from the **Network Name** field and click **Open**.

5.5. Adding templates

Before you install a device, you must import its device template into the LNS database.

- Select "**Manage/Templates"**.
- In the **Device Templates** window, click **Add**.
- In the "C:\LonWorks\Import\GentecV2" directory, select all the templates needed for the network.
- Once you have added them all in, click **Done**

It is now possible to add devices.



5.6. Installing the devices (cards)

Select the **Manage**/**Devices** menu in the Kameleon console. Click **Add**.

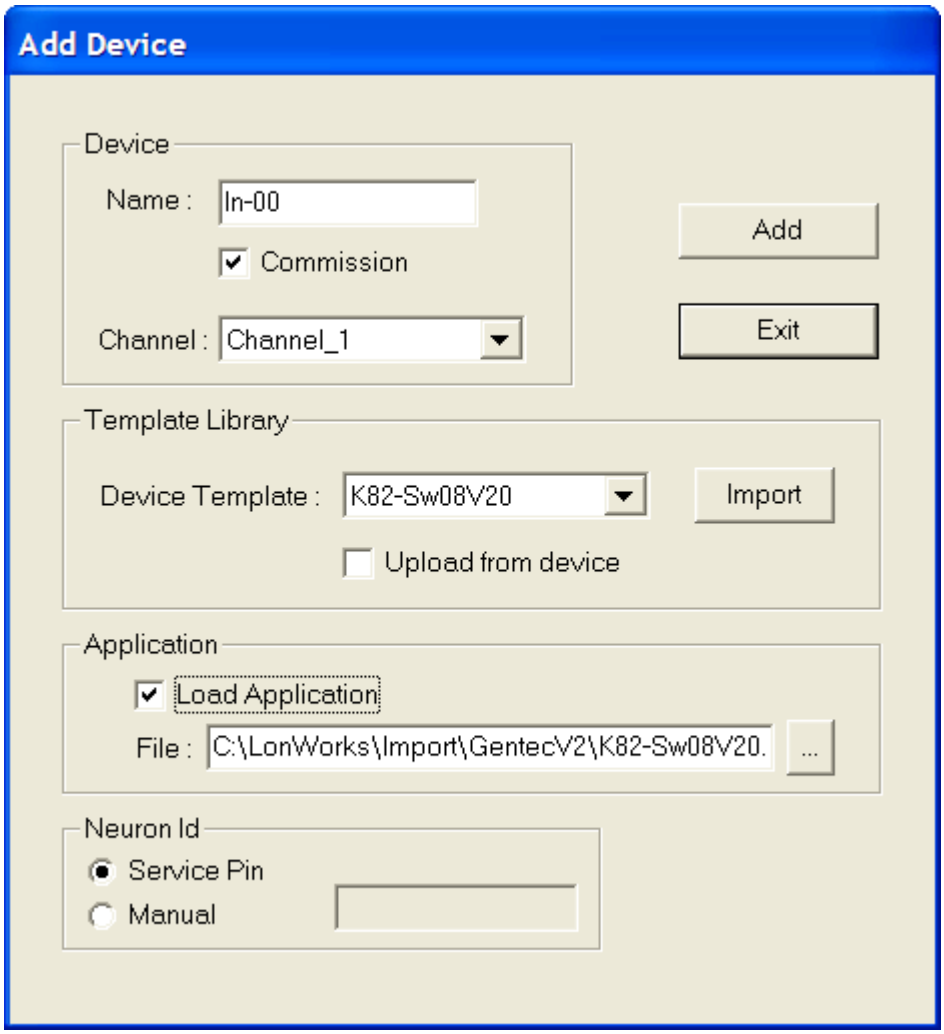
- Enter the name of the device to be added to the **Name** field.
- Determine whether you want to commission the device at this time or commission it later with the **Commission** checkbox.
- Select the channel the device must be connected to (refer to section 5.12.3 Channels & Routers).

- Select the device template that corresponds to the device and to the function you want to assign to the device. If this template is not available, add it via the **Import** function or, in some cases, the template can be imported from a device.

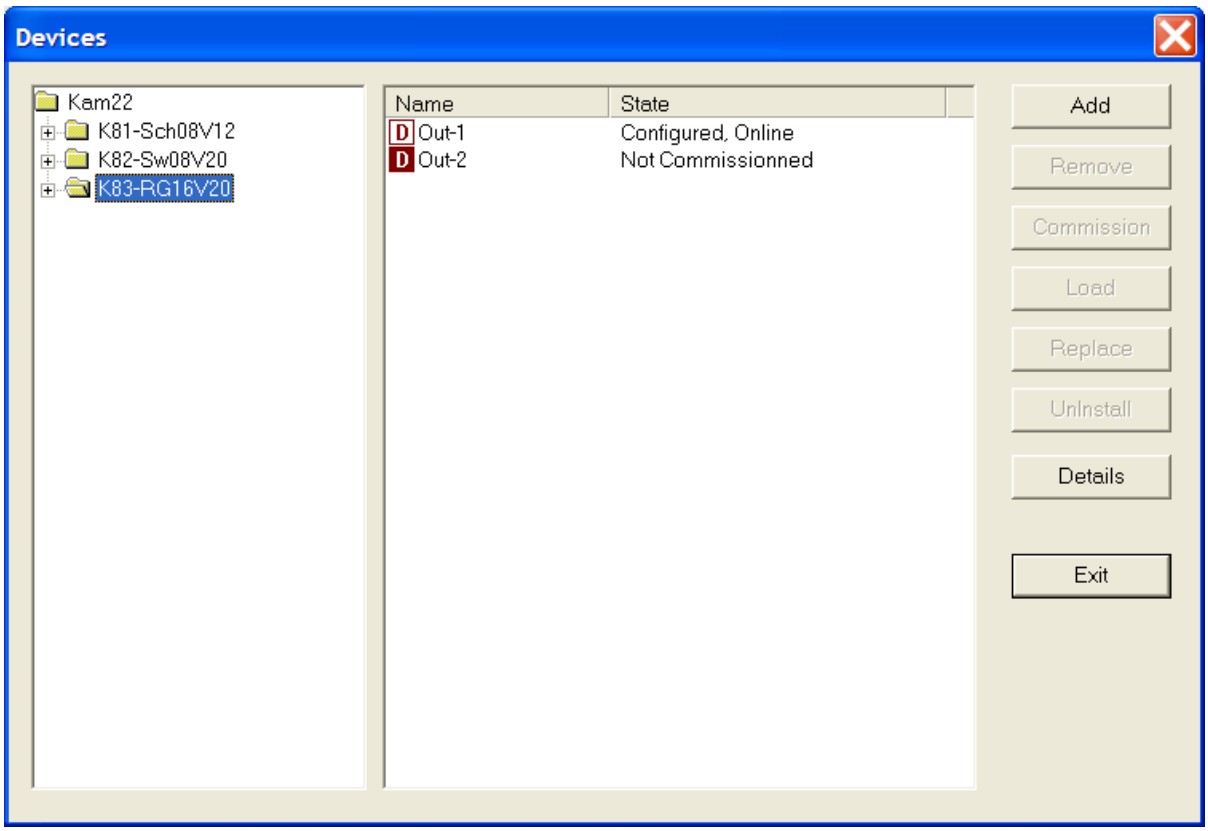
- Selecting the template automatically prompts the selection of the file needed for the application.

  Note: Keeping the **Load Application** box checked ensures the adequate memory content.

- If the **Commission** box is unchecked, just click **Add** and skip the rest of this step. Select how the neuron ID of the device is to be detected. You may use the service pin, for automatic identification or manually identify the device, if you know its neuron ID. In the first case, click to select the **Service Pin** box, click **Add** and push the **Service Pin** button of the device to be installed. The device is then installed and within a few seconds, the database is updated. If instead you select the **Manual** box, enter the twelve-figure number usually written on a sticker on the card; click **Add**: the device is then installed and, a few seconds later, the database is updated.



- To make sure that the device has been added and is installed on the network, go back to the **Manage**/**Devices** and click the template whose name is the same as the device type (*K81-Sch08Vxx, K83-RG16Vxx, K82-Sw08Vxx*, …). The name of the device should appear in the adjacent window. All the devices on the network can thus be viewed.



In the above screen, clicking **Details** prompts a chart with the details of the model used, the application version number, the neuron ID number, the subnet number and node ID (S/N) and the current state of the device. It also contains very useful commands to trace and determine the state of the device.

The **Test** function shows details pertaining to various communication parameters, the cause of the last device reset and the model and the processor's firmware version.

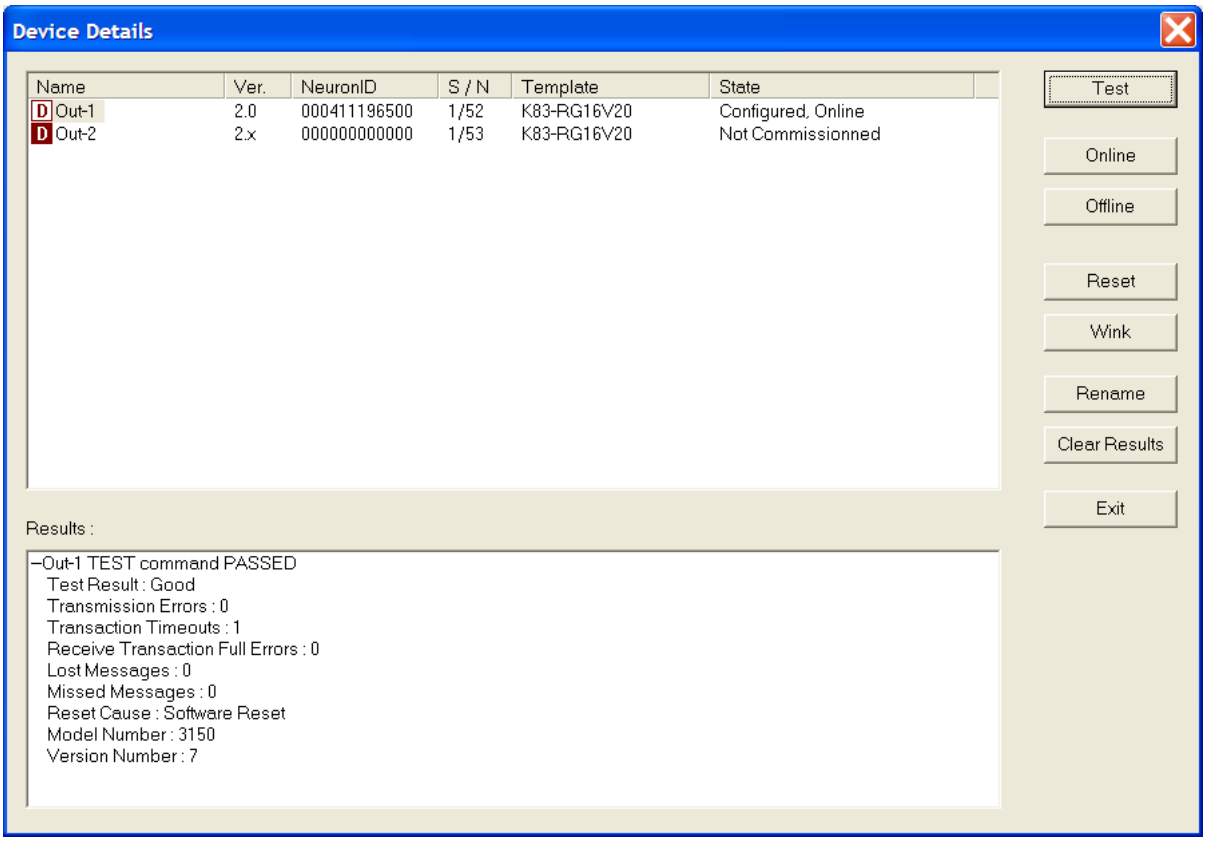
The functions **Online** and **Offline** activate and de-activate the device.

The function **Reset** commands the software reset of the device.

The function **Wink** locates visually a device by activating a specific command on it; for instance, with most Kameleon devices, the initialization LED is made to blink.

The function **Rename** renames the device.

The function **Clear** deletes the content of the **Results** window.

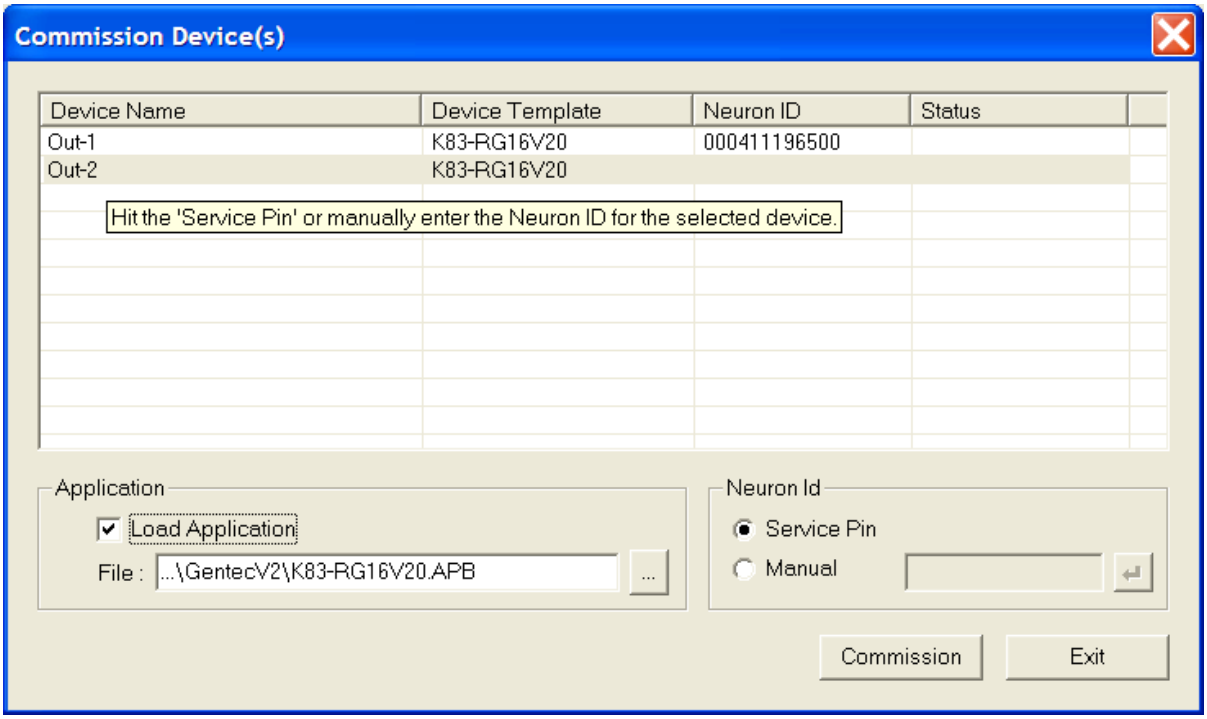


Now that the devices are installed, it is possible to create the relay groups.

NOTE :

A network can be configured (create relay groups, add switches to relay groups, …) when all the devices are installed (added to the network) but they don't have to be commissioned. However, when the network is completely configured, for the whole system to function properly, all the devices must be commissioned. To commission devices that has been previously installed :

- Select the **Manage/Devices** menu in the Kameleon console.
- Select a device template to show the corresponding devices in the right pane.
- Select the devices that need to be commissioned and click on the **Commission** button.



From there, each device must be assigned its *Neuron ID* whether by hitting the service pin on the card that corresponds to the selected device ('Out-2 in the example above) or by manually entering the 12-digit hexadecimal number. Also, the application to be loaded to each device is selected. When all the *Neuron IDs* have been collected, push the **Commission** button to start the commissioning of all the devices at once.

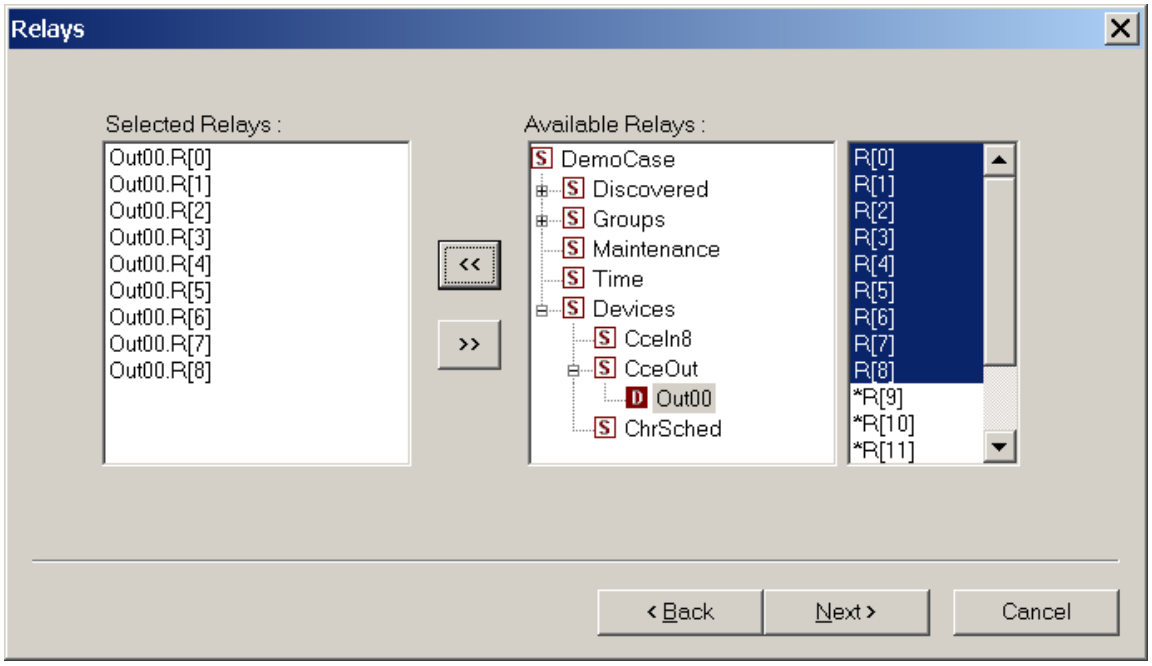
5.7.Relay Groups

From the menu, select **Manage/Relay Groups** and click **New, Delete** or **Modify**.

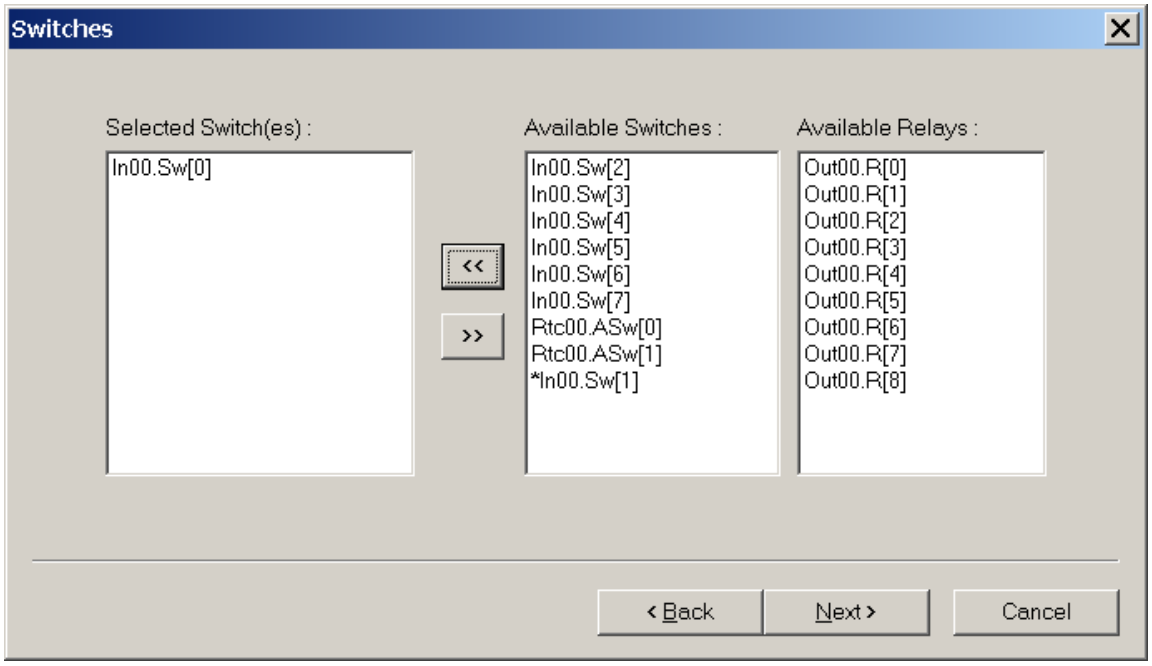
To add a group

- Click **New**;
- Enter the name of the group to be created; click **Next;**
- Select the relays to be included in the group; click **Next.**

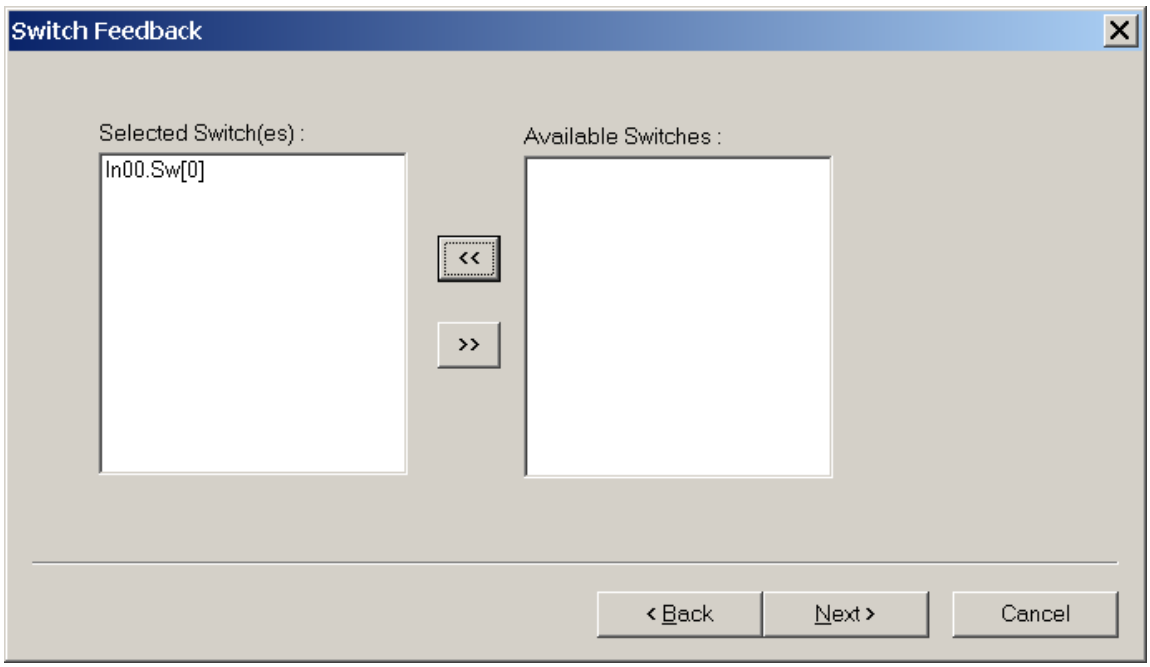
Note: The asterisk besides some LonMark objects, such as relays, schedulers and switches indicates that these objects are already part of a group. It is possible to include them in more than one group.



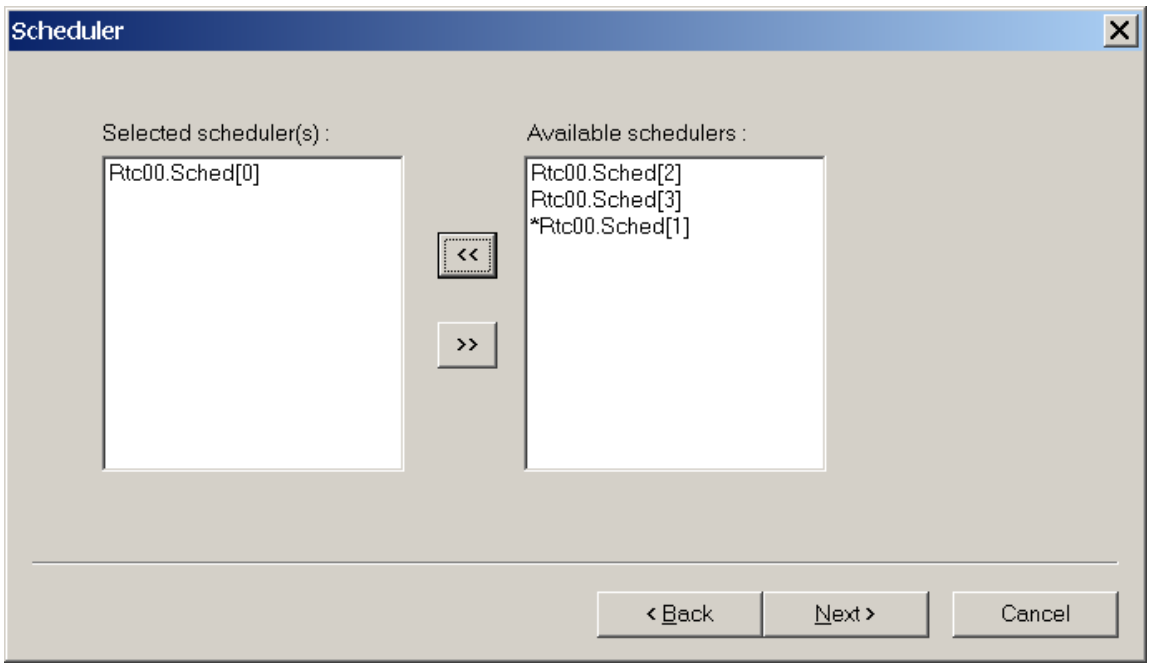
- Select the dry contact switches, the polarized switches, the analog switches and the group relays to be included in the group. Click **Next**.



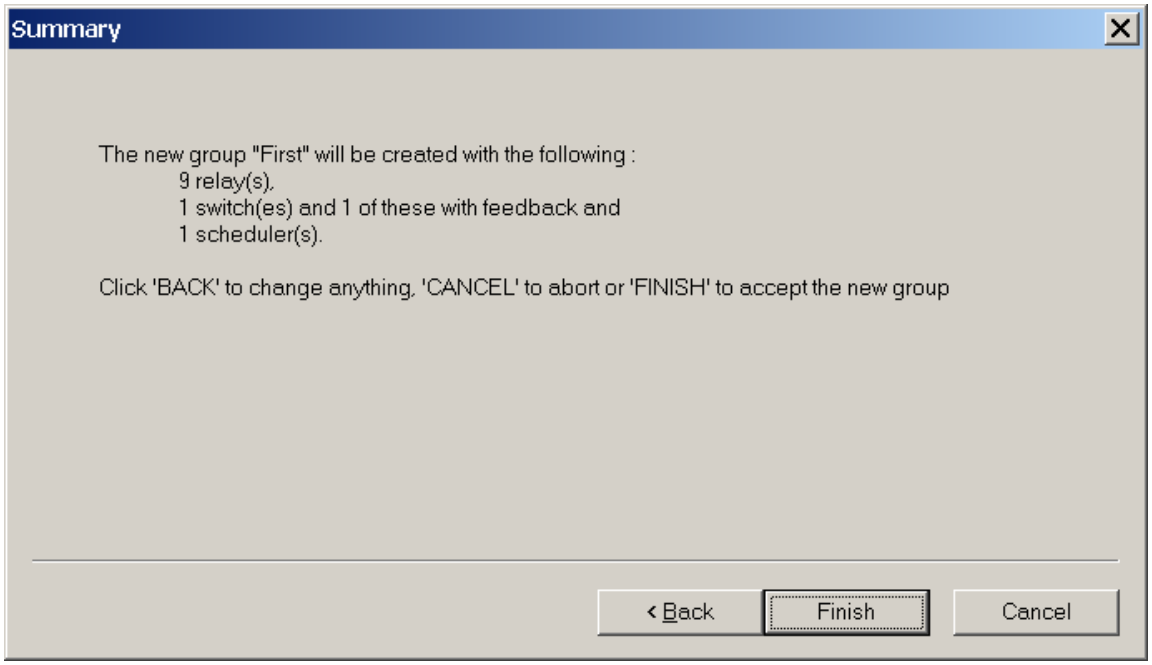
- Select the switches that must have feedback. Feedback is used only with polarized switches. Click **Next**.



- Select the schedulers. To access the schedulers, the CHR requires a ChrSchVx template. Click **Next**.



- Read the summary for this group and click **Finish** to confirm or **Back** to make changes. Below is an example.



Note: The total number of groups that can be included in a network corresponds to the number of CCEOut cards x 7. For example, if there are three CCEOut cards in a network, a maximum of 21 groups can be installed. Moreover, it is important not to exceed 32 different relay groups on the same card.

Once created, a group can always be modified with the **Modify** command.

It can also be deleted anytime with the **Delete** command.

5.8. Maintenance group

From the menu, select **Manage**/**Maintenance Group** and then, click **New**, **Delete** or **Modify.**

To add a maintenance group:

- Select **New**;
- Select the maintenance object to be included. A maintenance object can be used in only one group;
- Select the switch or switches to be included in the group. Switches cannot be part of more than one group. Click **Next**;
- Set the feedback on the polarized switch;
- Select the relay group or groups to be included in the maintenance group;
- Read the summary on this group and click **Done** to confirm or **Back** to make changes.

Once created, a maintenance group can always be modified with the **Modify** command.

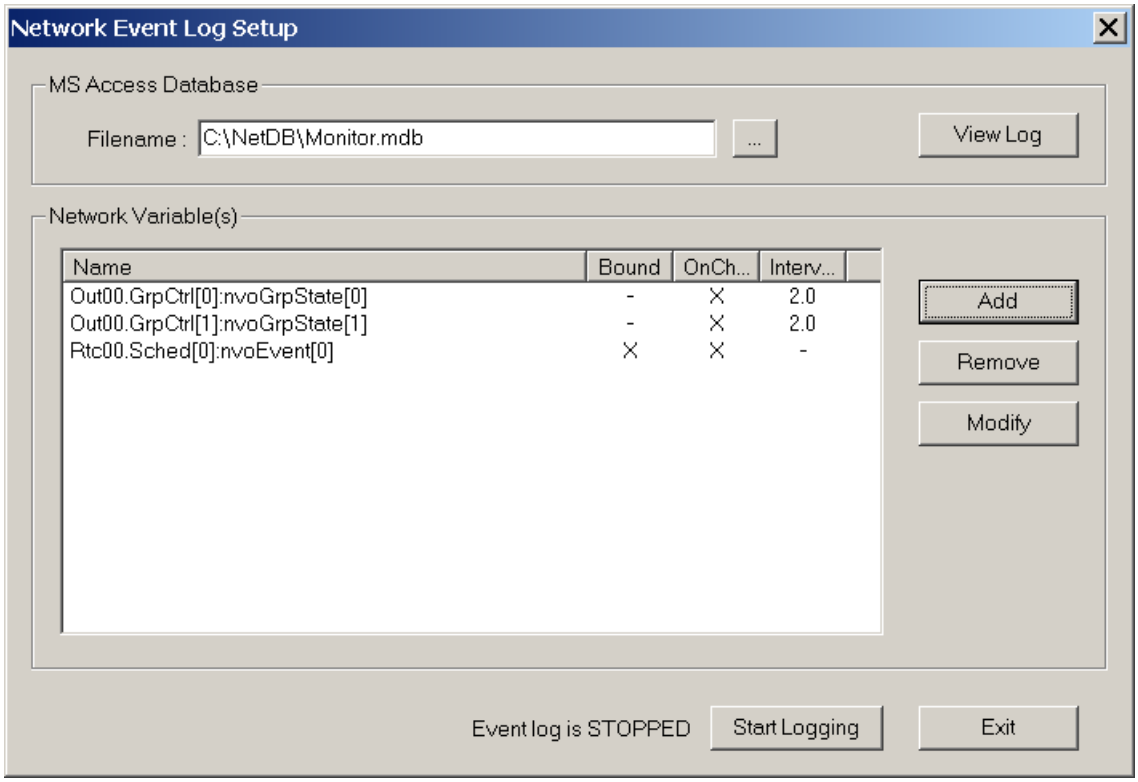
It can also be deleted anytime with the **Delete** command.

Remember that a maintenance group has precedence over a scheduled event. The latter is stored in the memory and once the maintenance group is inactive, the events in the memory are updated. However, the switches always remain active.

5.9. Network Event Log

Any network objects (group controller, relay, scheduler, …) can be monitored and the network events (output changes, periodic output polling, …) generated from these objects can be stored into a MS Access database. The database can then be used by any external tools (MS Access, Crystal Reports, …) to generate custom reports. Any modifications to the database can be done as long as the table name (Events) and its field names (EventName, EventValue and EventTime) are not changed. The data field size can be increased if necessary.

From the menu, select **Manage/Network Event Log**.



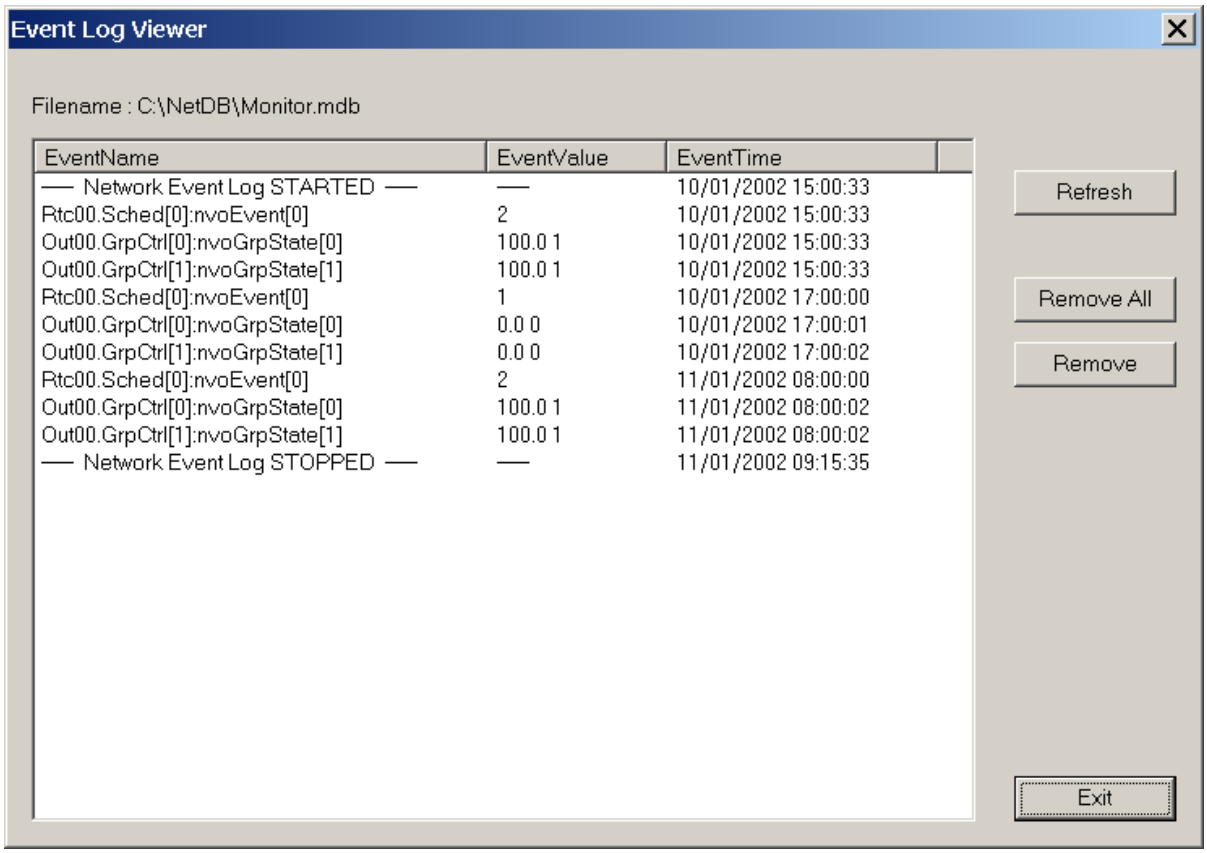
In the **MS Access Database** section, the user sets the database filename and can take a look at its contents with the **View Log** button (if the database was created for network event logging).

The **Network Variable(s)** section shows the list of network variables (points) to be monitored along with the monitoring method of each point. The list can be edited by adding new points or by removing or modifying existing points. The monitoring method can be set independently for each of the monitored points. The **Name** column represents the character string that will appear in the

EventName field of the log database when an event for that monitored point occurs. The list can be sorted by any of the 4 columns by clicking on a column header.

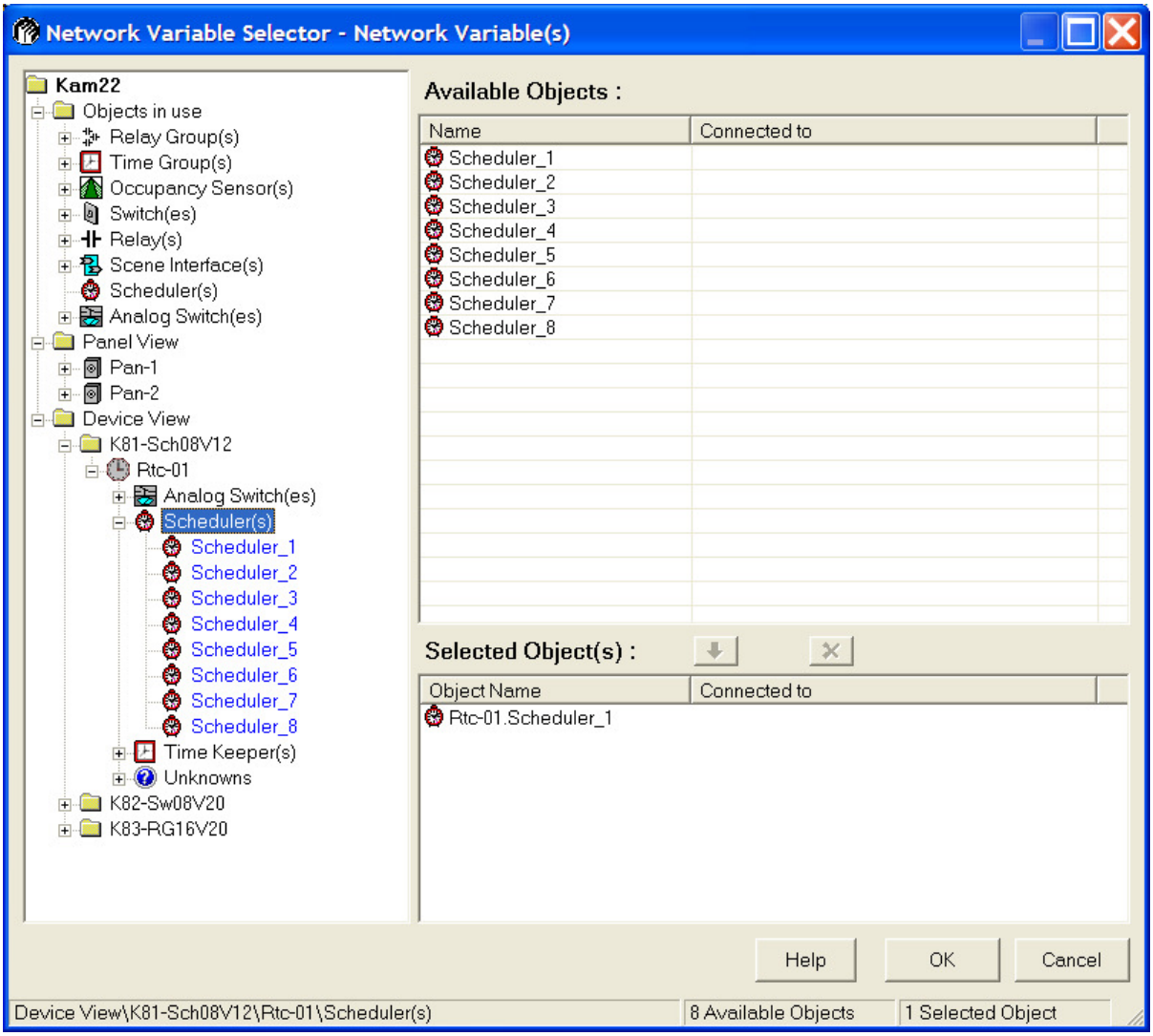
The current state (STOPPED or STARTED) of the Network Event Log is shown at the bottom of the window. Clicking on the button next to the text will change the state. When exiting the **Network EventLog Setup** window, the current state is saved and remains unchanged; i.e. if it was STARTED, it will continue to run until the Kameleon application is terminated and it will restart when the network is open.

The next image shows the content of a MS Access database.

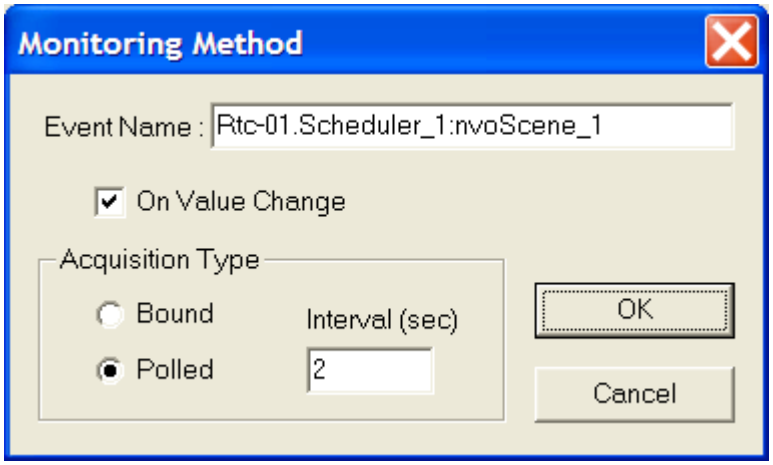


Records are added when the Network Event Log is started or stopped. Records are also added when monitor point(s) cannot be reached (network failure not shown here). The content can be sorted by any of the 3 columns by clicking on a column header.

The following image shows the **Network Variable Selector** used for adding new monitor point(s).



Next, the **Monitoring Method** window is used for adjusting the settings of monitor point(s).



The **On Value Change** check box specifies the Network Event Log to record events only when the value has changed. The acquisition type can be **Bound** or **Polled**. Bound means that an input network variable is created in the LNS Network Interface and it is bound to the monitor point. Polling is done by the LNS Data Server at a rate specified in the **Interval (sec)** box.

Bound monitoring has the advantage of being able to capture rapidly changing outputs without any delays but when the LNS network database is closed, the output is left connected to a non-existing input; this could cause some network errors on the monitored device.

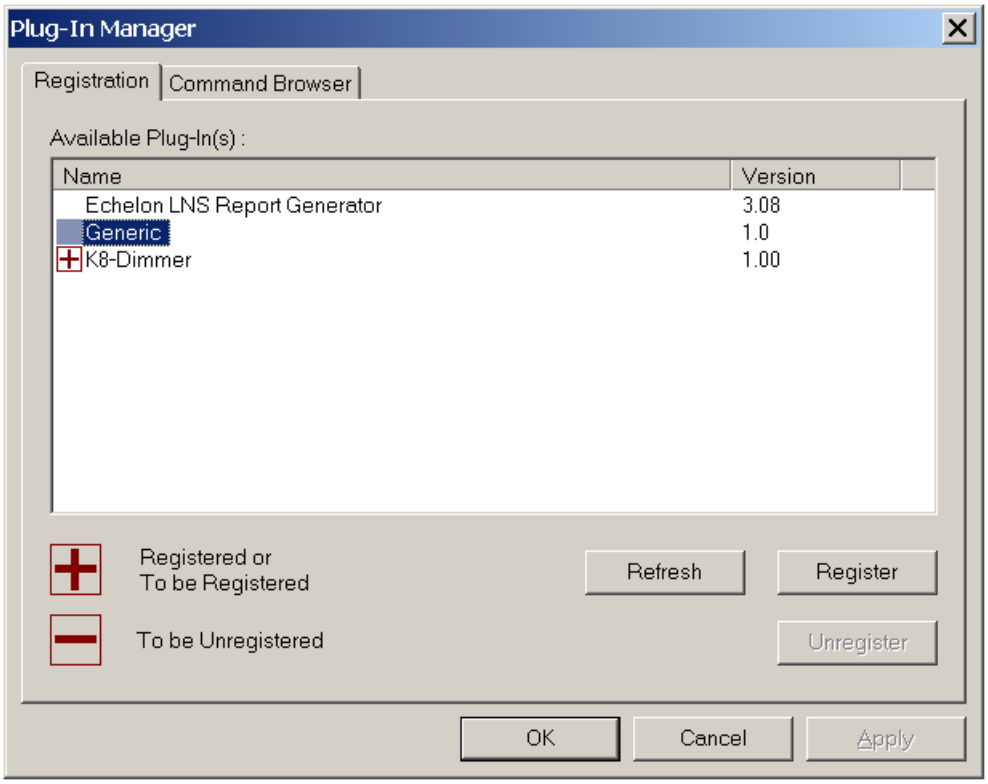
On the other hand, polled monitoring does not require any permanent bindings and the computer running Kameleon does all the work. However, polling a high number of outputs at short intervals (less than 2 seconds) could increase the network traffic considerably.

5.10. LNS Plug-Ins

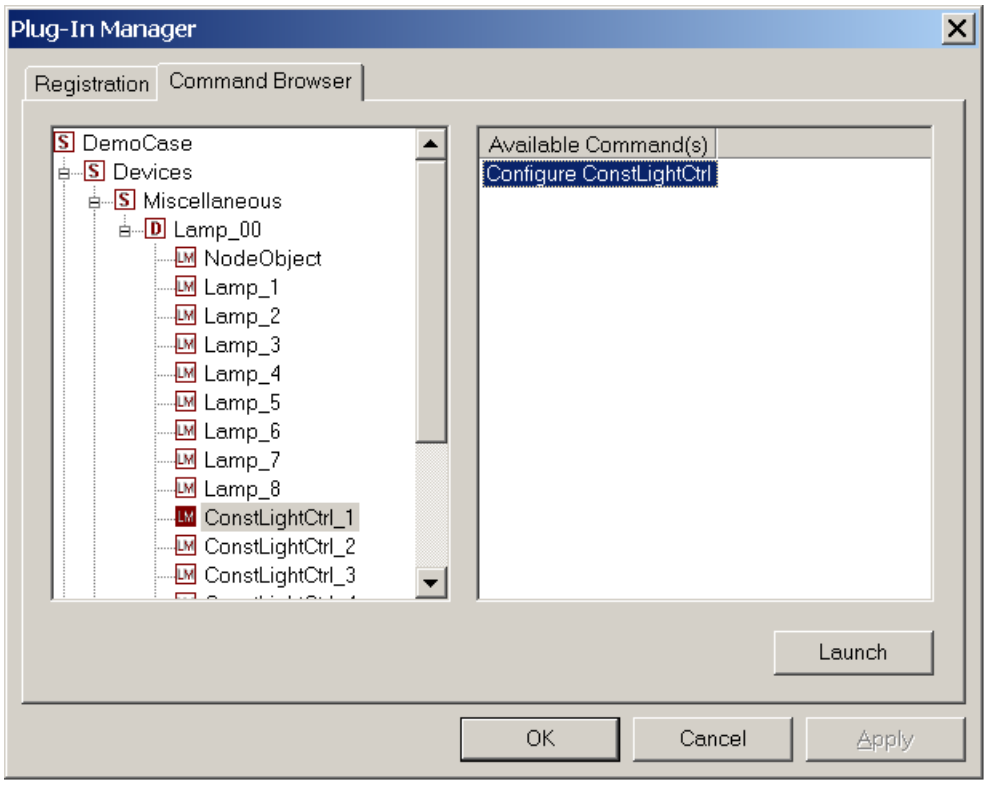
An LNS Plug-in is a special kind of Windows application implemented as an ActiveX automation server. Plug-ins provide a standard way to extend and customize the functionality of LNS applications such as Kameleon. A plug-in is defined by the action that it can perform; i.e. by the set of commands that it provides and by the class of objects that each command operates on. For example, a plug-in might implement two actions, a 'Configure' command for 'Constant Light Controller' class objects and a 'Configure' command for 'Lamp Actuator' class objects.

An LNS Plug-in cannot run by itself; it get launched from a 'director application' and, starting with version 1.50, Kameleon is such an application. This new functionality offers the benefit of making access to a manufacturer's application completely transparent to the end-user.

In order to be available to a user, a plug-in must be registered with the LNS database. The 'Registration' section of the Plug-In Manager (accessed via **Manage**/**Plug-Ins** menu) displays a list of available plug-ins. On some occasions, a plug-in may have to be registered more than once; for example, when a new template is added or when a new version of the plug-in is installed. The following image shows the 'K8-Dimmer' plug-in as the only one already registered.

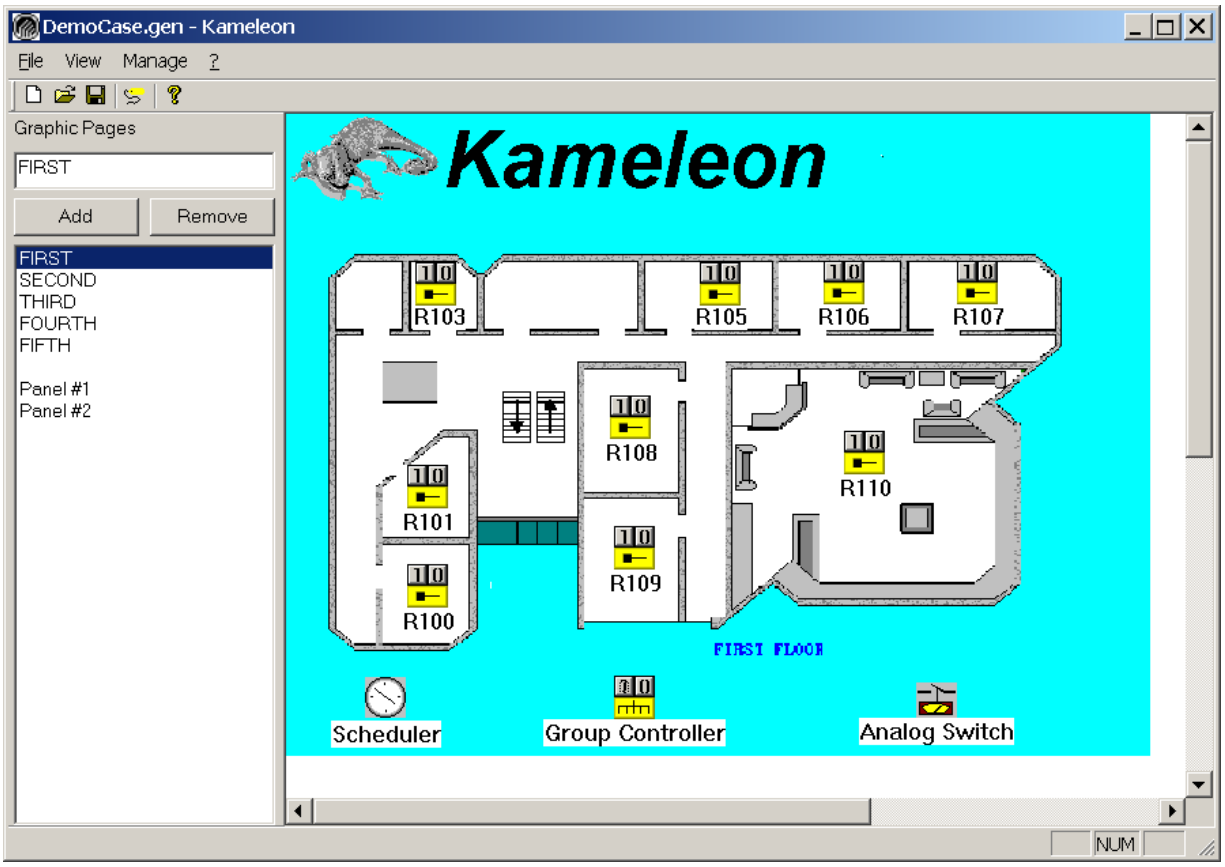


The 'Command Browser' section (next image) shows a list of available command(s) for an object (system, device or LonMark object) and offers the possibility to launch the appropriate plug-in with the selected command.

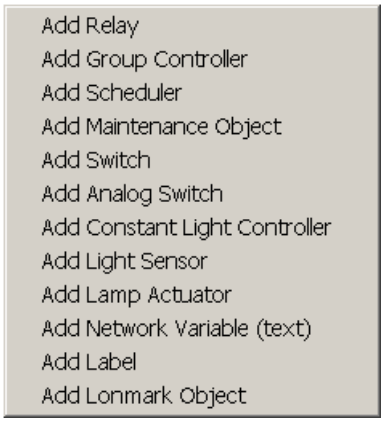


5.11. Creating a graphic page

You will find below an example of a network database. In the upper left-hand corner, there is the name of the file currently in use on the console: *DemoCase.gen*. Under the icons **New**, **Open** and **Save**, the words *Graphic Pages* are written over the field containing the current active page (*FIRST*). Underneath are the keys **Add** and **Remove**, to add or remove a graphic page. The following window lists all the graphic pages in the database. The large window shows the LonMark objects to be displayed.



To create a graphic page, enter the name of a page in the *Graphic Pages* field, in the upper left-hand corner of the console and click **Add**. To place objects on it, place the cursor in the large window and click the right mouse button (right-click). The objects are the following:



Right-clicking on any object within a graphic page shows a list of available actions for that object; in the form of a popup menu. Actions in the lower part of the menu (below the separator) are LNS PlugIns commands.

NOTE : Any object with the main drawing item painted in red usually means the device cannot be reached from the network; it could be a network failure, a not-commissionned device or the system was opened 'offnet'.

5.11.1. LonMark object

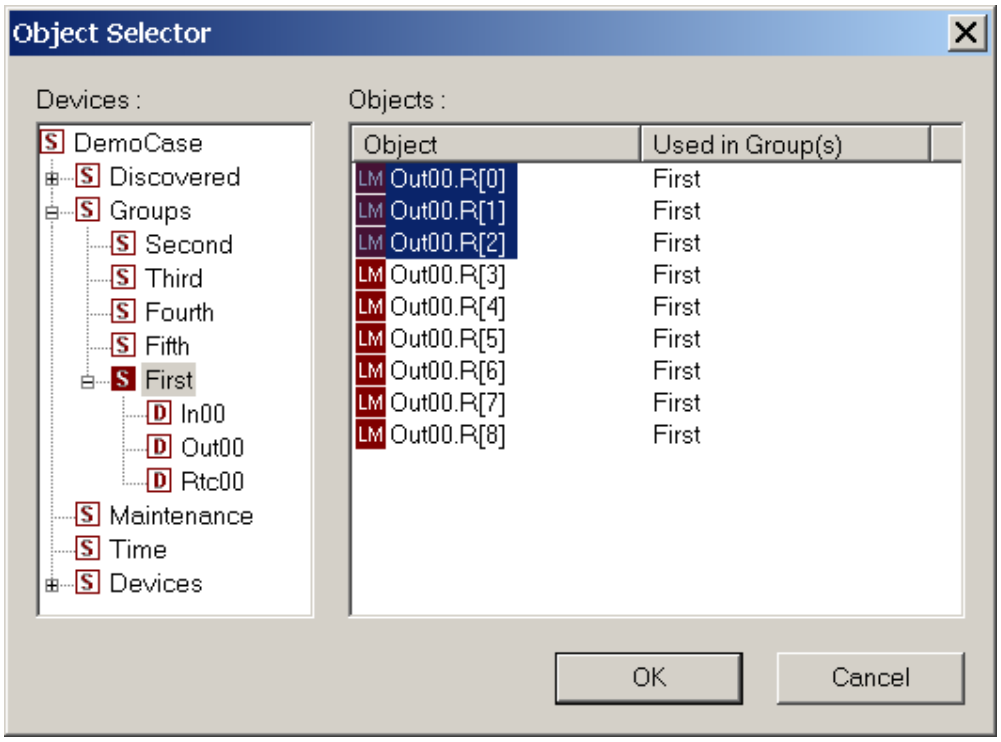
Each LonMark object in the network is available and is indicated by a question mark. Objects make it possible to view the state of their network variables and their Config Properties.

5.11.2. Label

This function makes it possible to add text to a graphic page. However, the text is not coupled with any object and can always be seen on the graphic page. To couple a label with an object, place the cursor on the object and click the right mouse button: from there, it is possible to create a label and to couple it directly with an object. The text coupled with the object can be made visible or invisible by clicking the label function icon, located between the **Save** and the **Help** icons in the toolbar of the console.

5.11.3. Relay

This function makes it possible to add relay(s) on a graphic page. More than one relay can be selected at a time. The following example, shows the selection of 3 relays within the "First" relay group. Once the relay is on the graphic page, it is possible to view its state: yellow means it is activated and blue means it is de-activated. To activate it directly from the LonMark object, click 1 to activate it and 0 to de-activate it.



5.11.4. Switch

This function makes it possible to add switch(es) on a graphic page. More than one switch can be selected at a time. Once the switch is on the graphic page, it is possible to view its state: yellow means it is activated and blue means it is de-activated. When the relay group includes more than one switch, the switch to be monitored has the same status as when it was last activated. This means that two switches in the same group may not show the same status.

5.11.5. Scheduler

A clock symbolizes the scheduler.

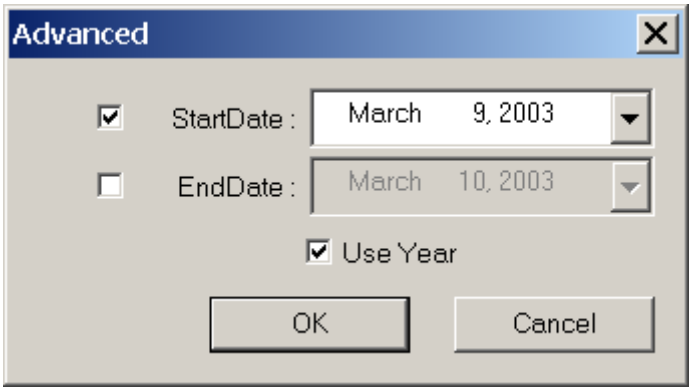
- When the scheduler object is added to the graphic page, double-click on it to open a dialog box or right-click it and select “Open Dialog…”.
- Click the **ADD** button to add a task to the scheduler.
- Select the event number by selecting a figure in the box at the right-hand side of the task box. The table of correspondence between the figure and the action to be carried out is found in the dialog box of the group controller; it can be modified if necessary. If such is the case, it is recommended to modify the 10-12 actions, so that the first nine events are kept standard.
- Select the operation mode of the scheduler: whether in standard time or in solar time. In the first case, you enter the exact time of day when the action must be carried out. In the second

case, you specify how much time before or after sunrise or sunset the action should take place.

- Assign the priority level to the action; the priority levels range from 1 to 10, in ascending order. When many tasks are planned on the same scheduler with many of them sharing the same priority level, the programmer must pay special attention to the sequence of these tasks, to avoid conflicts in their completion. Remember that only the tasks of the day with the highest priority will be performed. Those with lower priority will be ignored for the day. This facilitates the programming of non-business days and special events.

- Select the type of tasks: one-time, daily, weekly or monthly. You must complete a different section for each one.

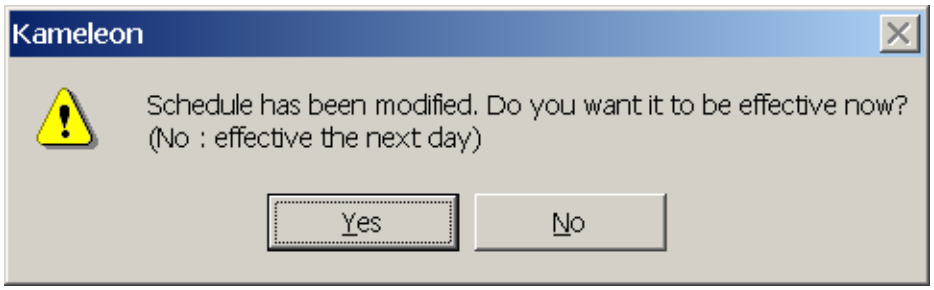
- You may complete the **Advanced** section to get the schedule to start and/or end on a specific date; otherwise, tasks will run forever. A task can be active between the same two dates every year by unchecking the **Use Year** button.



- The **Schedule Preview** button offers the possibility to see the event list of a typical day.

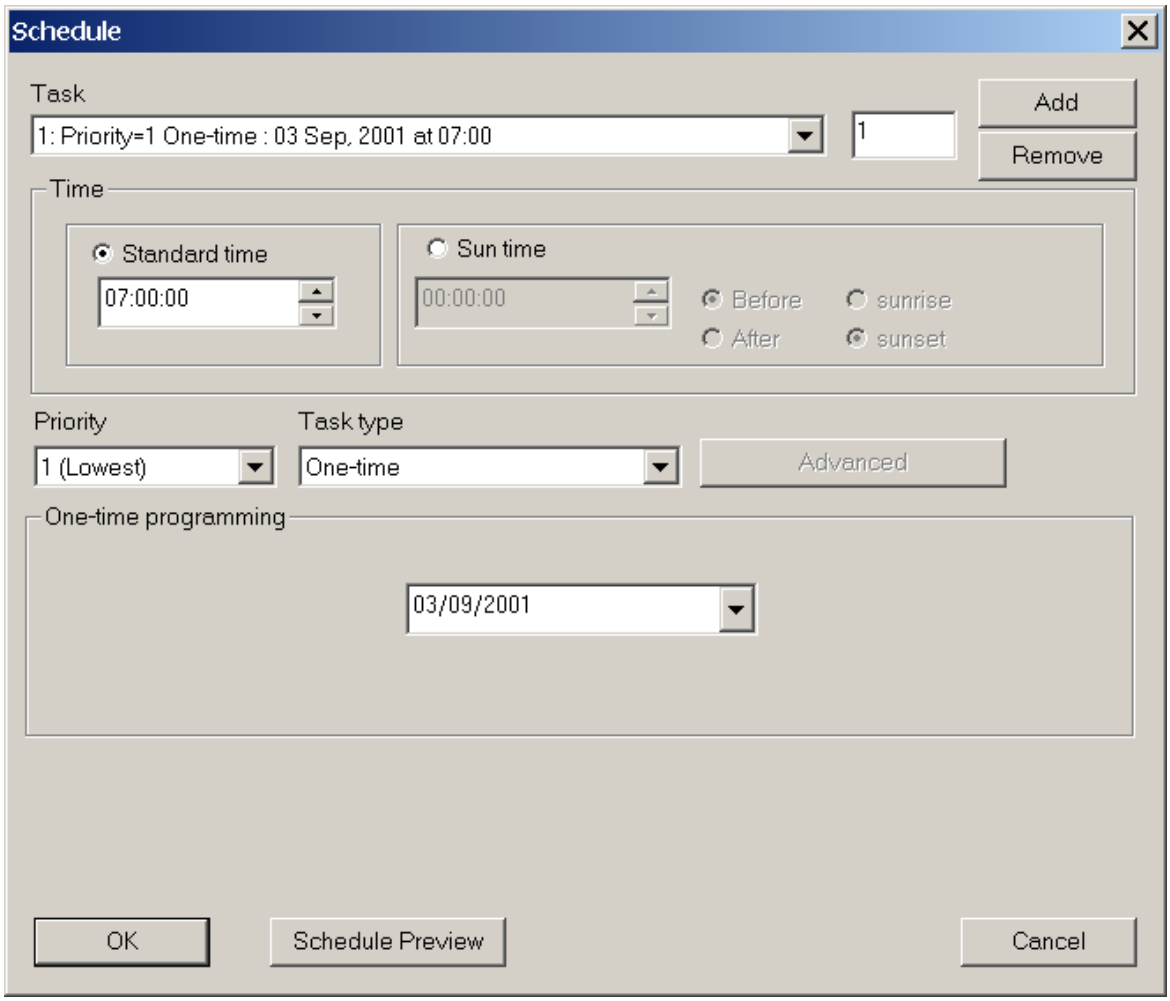
- You can add as many tasks as necessary. Click OK to confirm new entries.

- The following window pops up. A **YES** answer prompts immediate implementation of the changes made to the scheduler. A **NO** answer makes the changes effective the following day, at midnight (0:00), when the network schedulers update the tasks for the day.

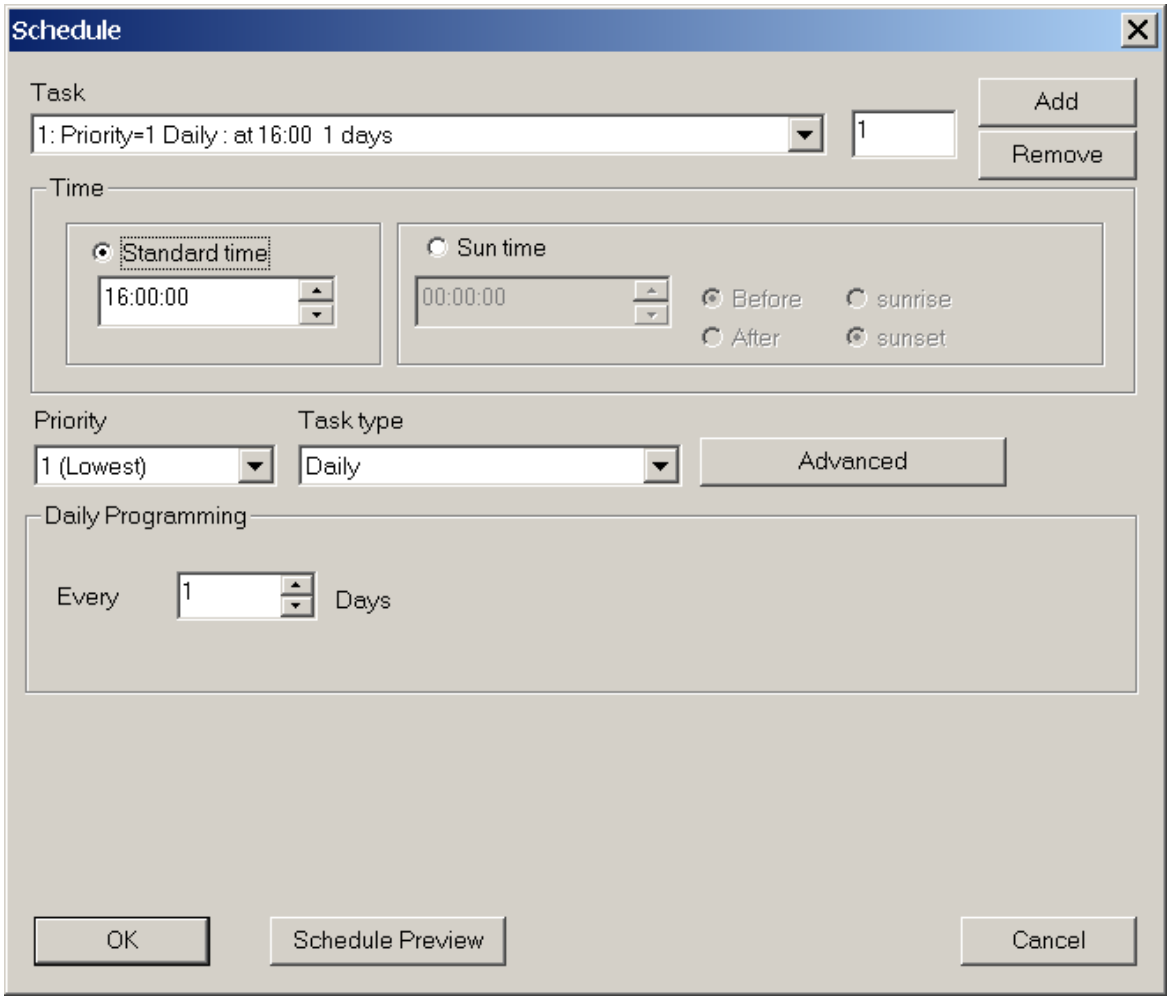


You will find below examples of different scheduler programs.

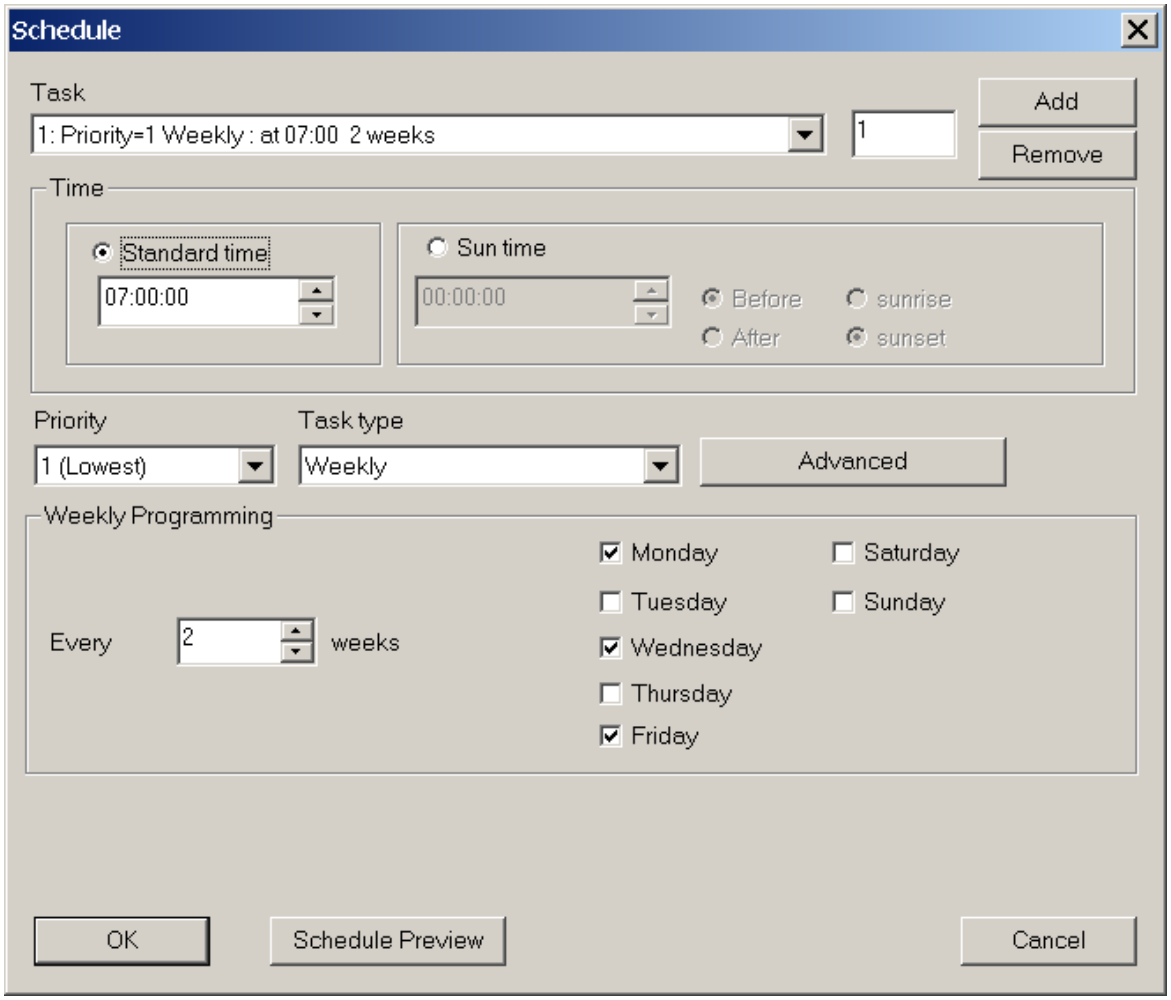
The first case deals with a one-time event. In the next screen, a task has been programmed for September 3, 2001, at 7:00 a.m. This event will take place only once.


Schedule
Task
1: Priority=1 One-time : 03 Sep, 2001 at 07:00
1
Add
Remove
Time
Standard time
07:00:00
Sun time
00:00:00
Before
sunrise
After
sunset
Priority
1 (Lowest)
Task type
One-time
Advanced
One-time programming
03/09/2001
OK
Schedule Preview
Cancel

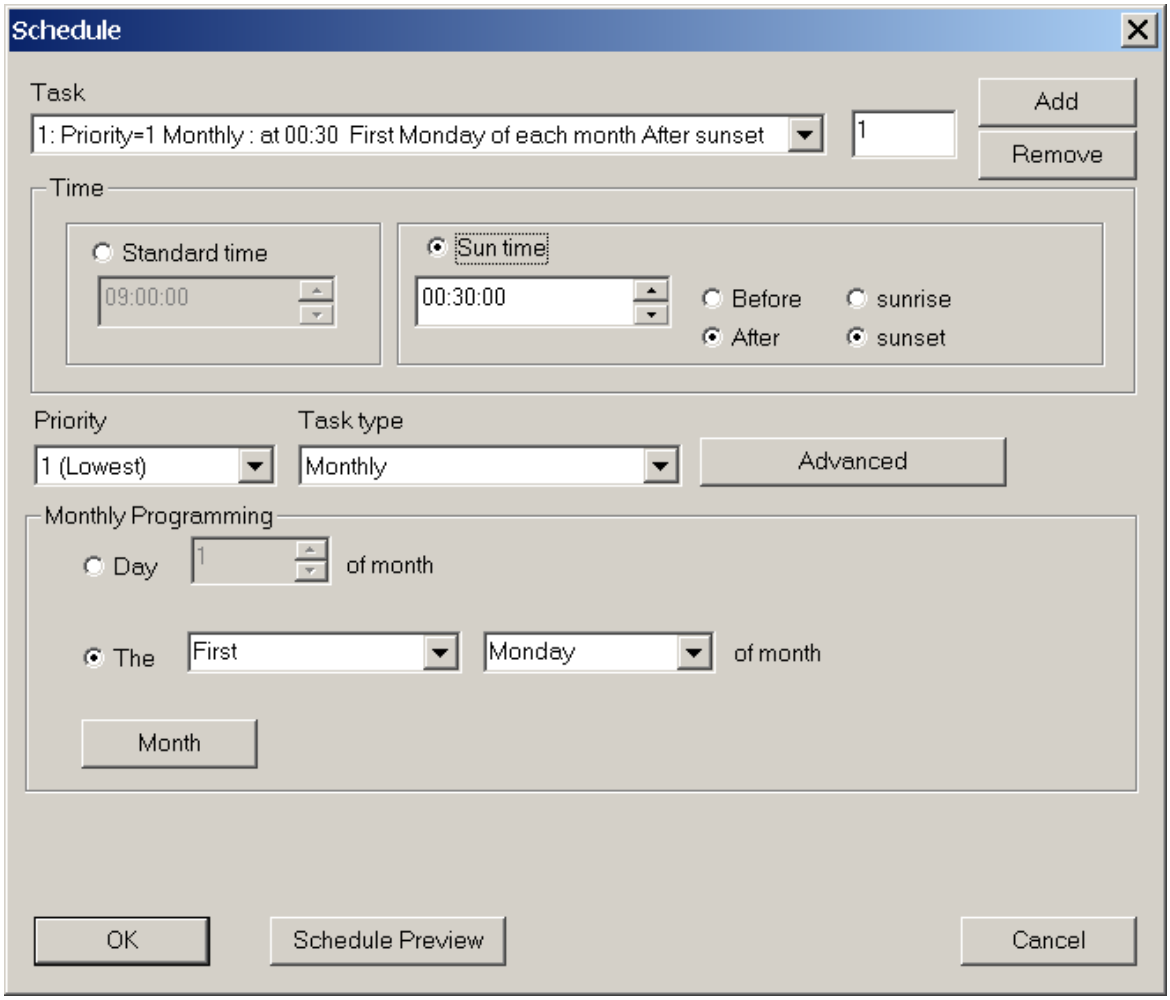
The second example shows a daily scheduler who controls event No. 1 (Off) everyday, at 16:00 (4:00 p.m.). The end date for this event is established through the **Advanced** priority.



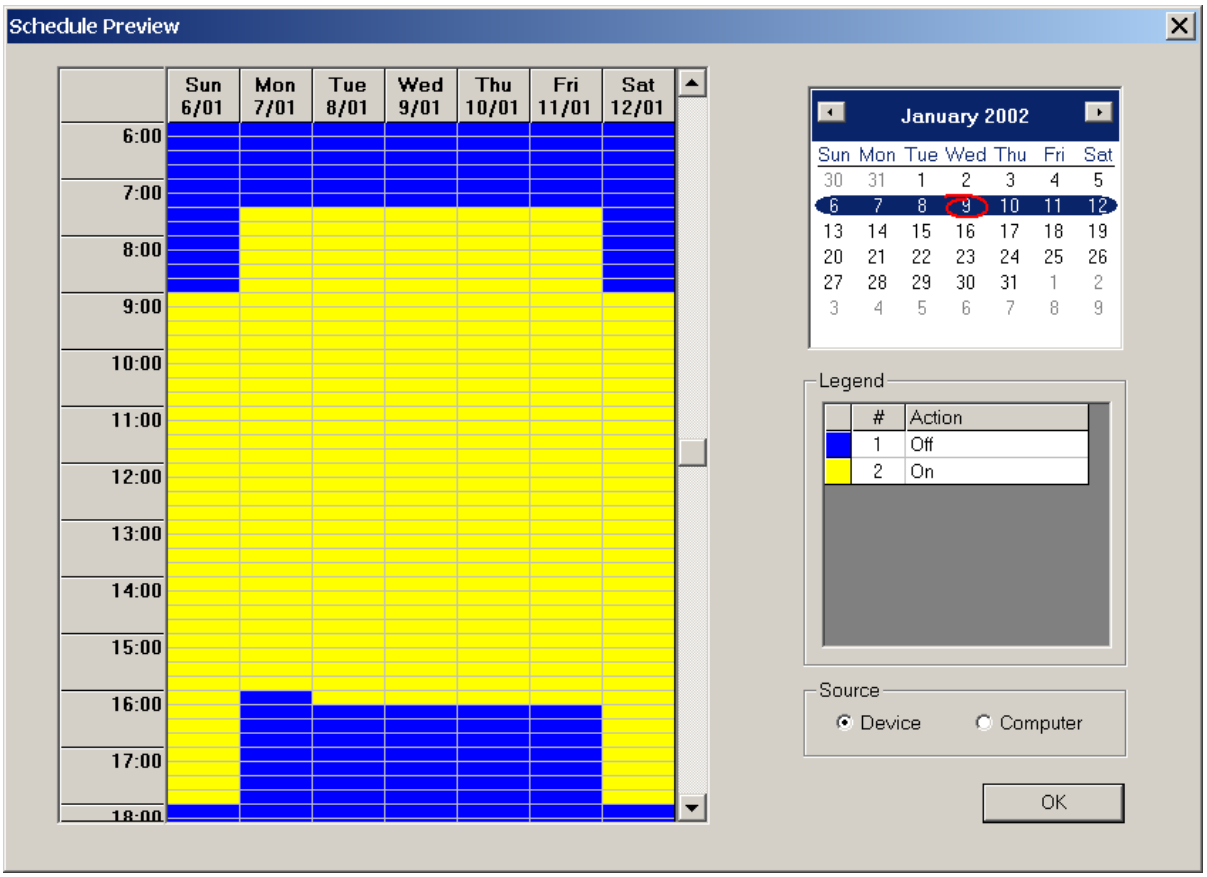
The third example is a weekly schedule that controls event No. 1 (Off), every second week, on Monday, Wednesday and Friday, at 7:00 a.m.



The fourth screen shows a monthly scheduler that controls event No. 1 (Off) the first Monday of every month 30 minutes after the sunset.

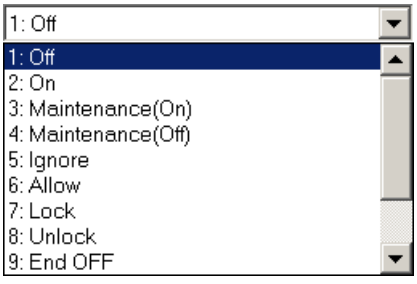


The next screen shows the **Schedule Preview** of a scheduler configured with tasks set at sunrise and sunset during weekdays and tasks set at fixed hours during weekend.



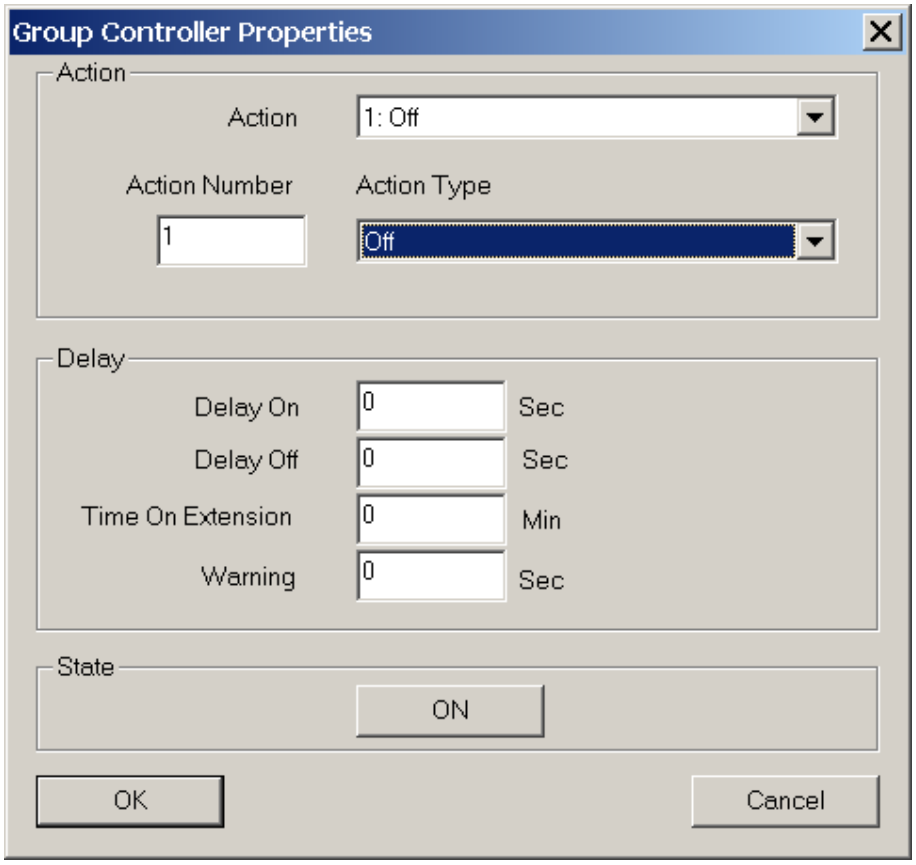
5.11.6. Group controller

Below is the table of correspondence for the actions. If you need to modify this table, it is recommended to modify actions 10-12, specifically designed for this purpose, and to keep the first actions as they are.



- Off: de-activate the group
- On: activate the group
- Maintenance (On): activate the maintenance mode
- Maintenance (Off): de-activate the maintenance mode

- Ignore: ignore events
- Allow: re-activate events
- Lock: de-activate switches
- Unlock: re-activate switches
- End OFF: cancels all 'Off' features: Warning and Time On Extension



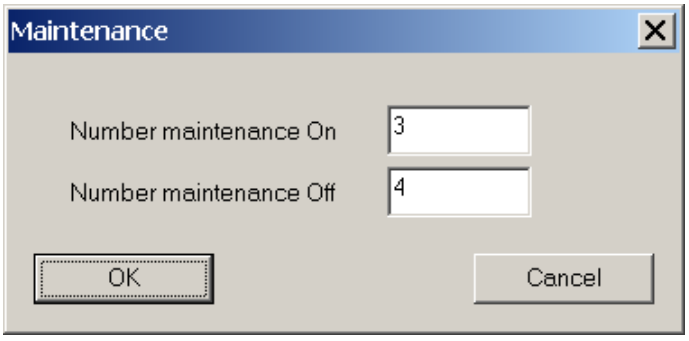
- The **Action** section is used to establish the table of correspondence for the scheduler.

- The **Delay** section is divided into four parts. The **Delay On** represents the interval between the activation of the schedule and the activation of the relays; the **Delay Off** is the interval between the de-activation of the schedule and of the relays. The **Time On Extension** is a fixed period when the lights are programmed to turn on in the manual mode, and after which the lights are turned off. The **Warning** function indicates that the lights will be turned off and is used only for schedulers and in the **Time On Extension** mode. To indicate that the lights-on period is ending, the **Warning** function makes the lights blink and after the warning period, the lights are turned off. If this field is left empty, the lights will be turned off without warning. The maximum duration of each of these four functions is 6,553 seconds, which means 110 minutes.

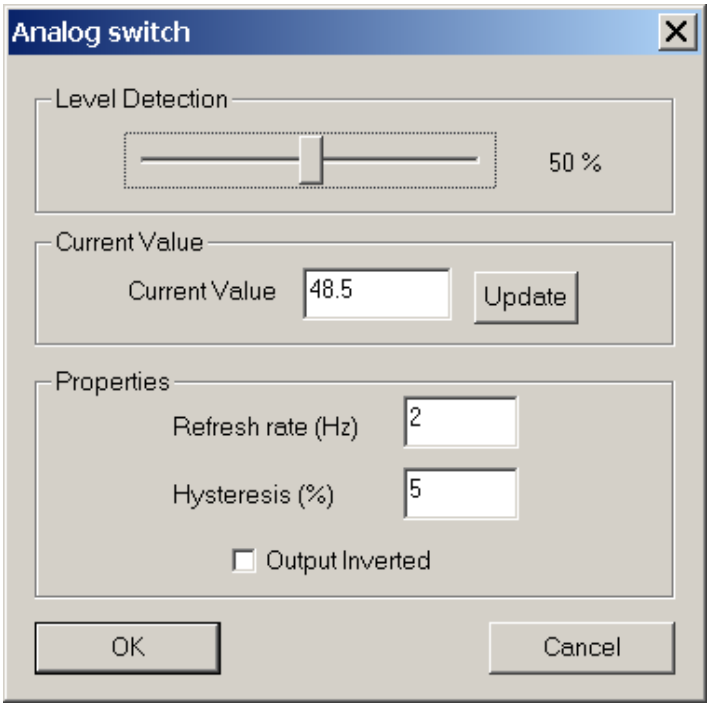
- The **State** section monitors the state of the group controller and allows activating or de-activating the group as needed.

5.11.7. Maintenance object

The screen below appears by adding a maintenance object. By default, event 3 refers to the maintenance being On and the event 4, to the maintenance being Off. It is possible to change these events to prompt other actions.

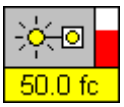


5.11.8. Analog switch



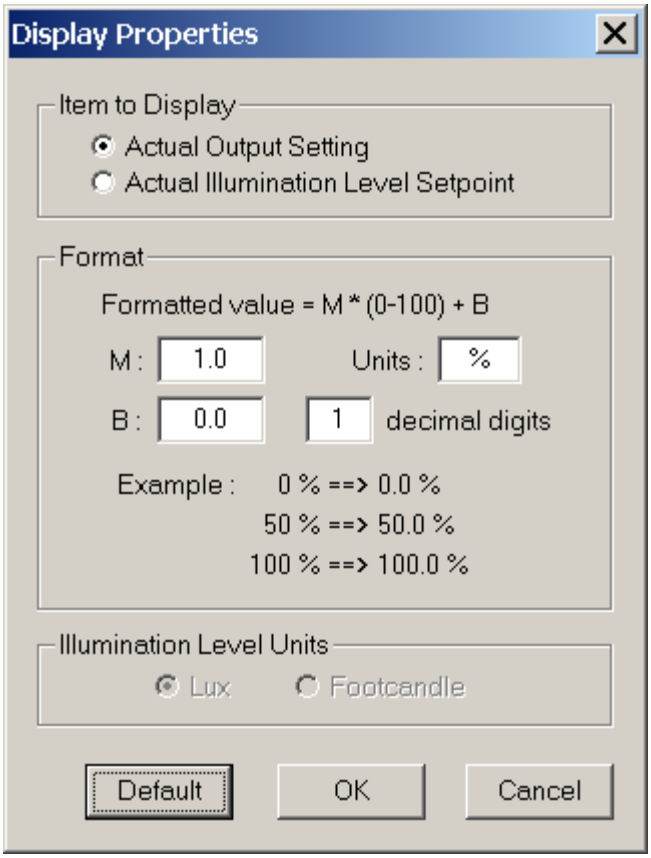
- The scale in the **Detection Level** section sets the level for detecting the analog input.
- The current value displays the value read by the analog-to-digital converter. The **Update** button updates this value.
- The **Refresh Rate** represents the number of refresh operations carried out by the system every second.
- The **Hysteresis** determines the gap between the status change points and the actual detection level. For example, if the detection level is set to 50% and the hysteresis is 5%, the system detects a high level at 55% and a low level at 45%. Between these two percentages, the status bears the value of the last status change. This makes the system more stable and avoids variations between high and low levels. However, the higher the hysteresis, the less sensitive the detection level.
- The **Output inverted** checkbox reverses the output status of the analog-digital input.

5.11.9. Constant Light Controller

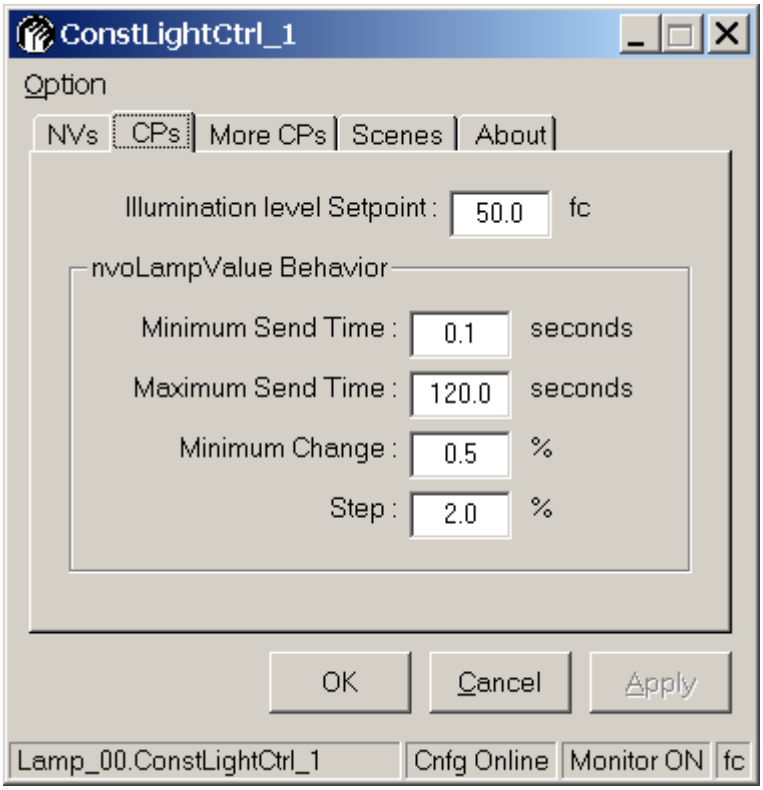


A Constant Light Controller object displays the state and the value of a controller's actual output and also the actual light level setpoint can be displayed. The output state is determined by the color of the small 'bulb' and of the text background; yellow means ON, blue means OFF and red means 'unreachable'. The output value (0-100) is shown in the form of a red bar graph in the upper right corner. The output value is also shown in the text section in a formatted way. Right-clicking the

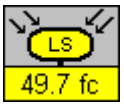
object and selecting **Display Properties** opens a dialog box used for selecting the item to display (output or light setpoint) and for formatting the output value.



Right-clicking the object and selecting **Configure ConstLightCtrl** launches the corresponding LNS Plug-In (if installed and registered). From that application, the network variables and the config properties can be monitored and modified.

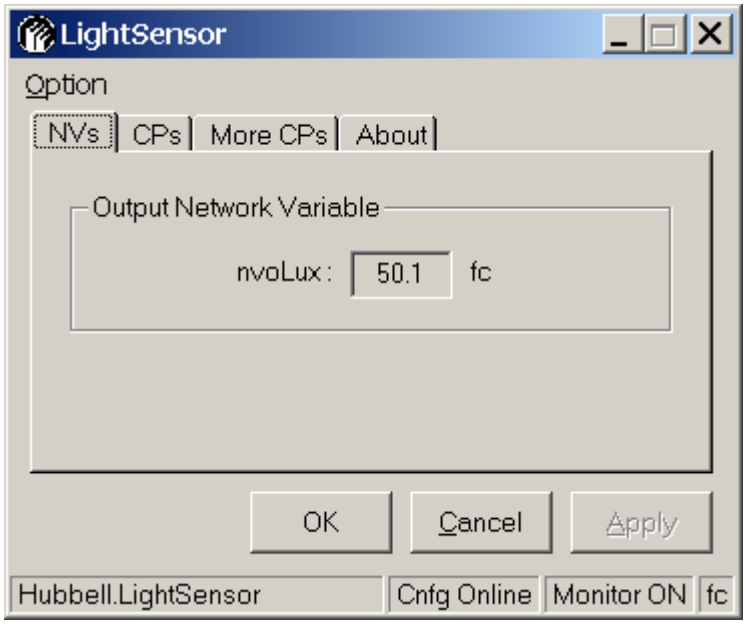


5.11.10. Light Sensor

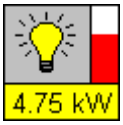


A Light Sensor object displays its current reading in the text portion. The light level units of the current reading can be set to **Lux** or **Footcandle** by right-clicking the object and selecting the appropriate units.

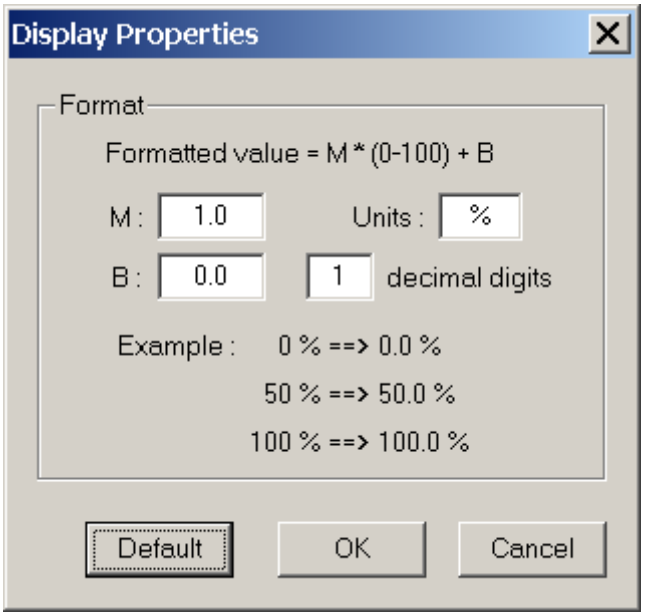
Right-clicking the object and selecting **Configure Light Sensor** launches the corresponding LNS Plug-In (if installed and registered). From that application, the network variables and the config properties can be monitored and modified.



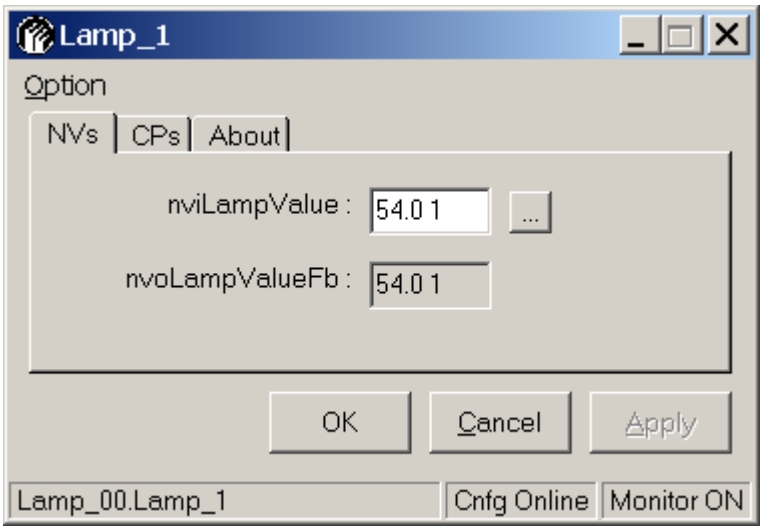
5.11.11. Lamp Actuator



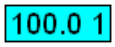
A Lamp Actuator object displays the state and the value of a lamp. The state is determined by the color of the 'bulb' and of the text background; yellow means ON, blue means OFF and red means 'unreachable'. The value (0-100) is shown in the form of a red bar graph in the upper right corner. The value is also shown in the text section in a formatted way. Right-clicking the object and selecting **Display Properties** opens a dialog box used for formatting the value.



Right-clicking the object and selecting **Configure Lamp** launches the corresponding LNS Plug-In (if installed and registered). From that application, the network variables and the config properties can be monitored and modified.



5.11.12. Network Variable (text)

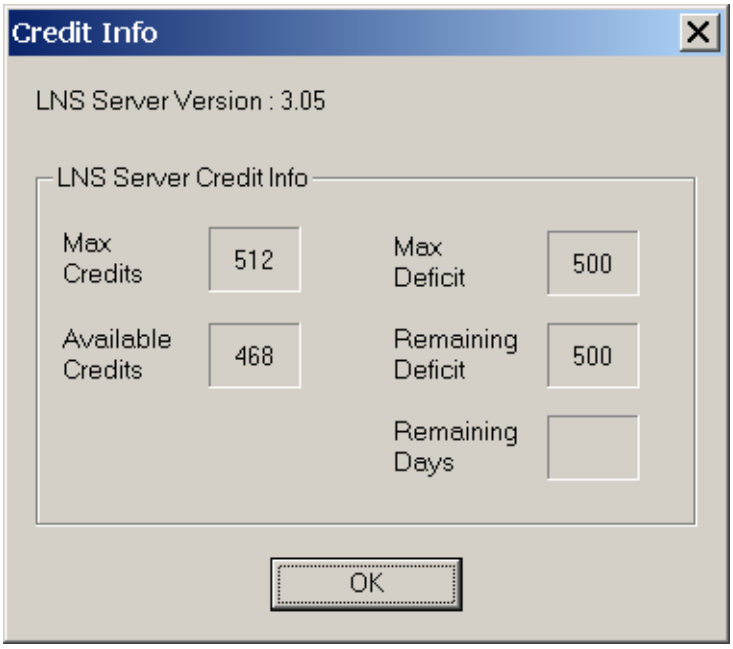


Any network variable of the system can be monitored and its formatted value be displayed on a graphic page. The display box adjusts its width according to the text to being displayed.

5.12.Other options of the console

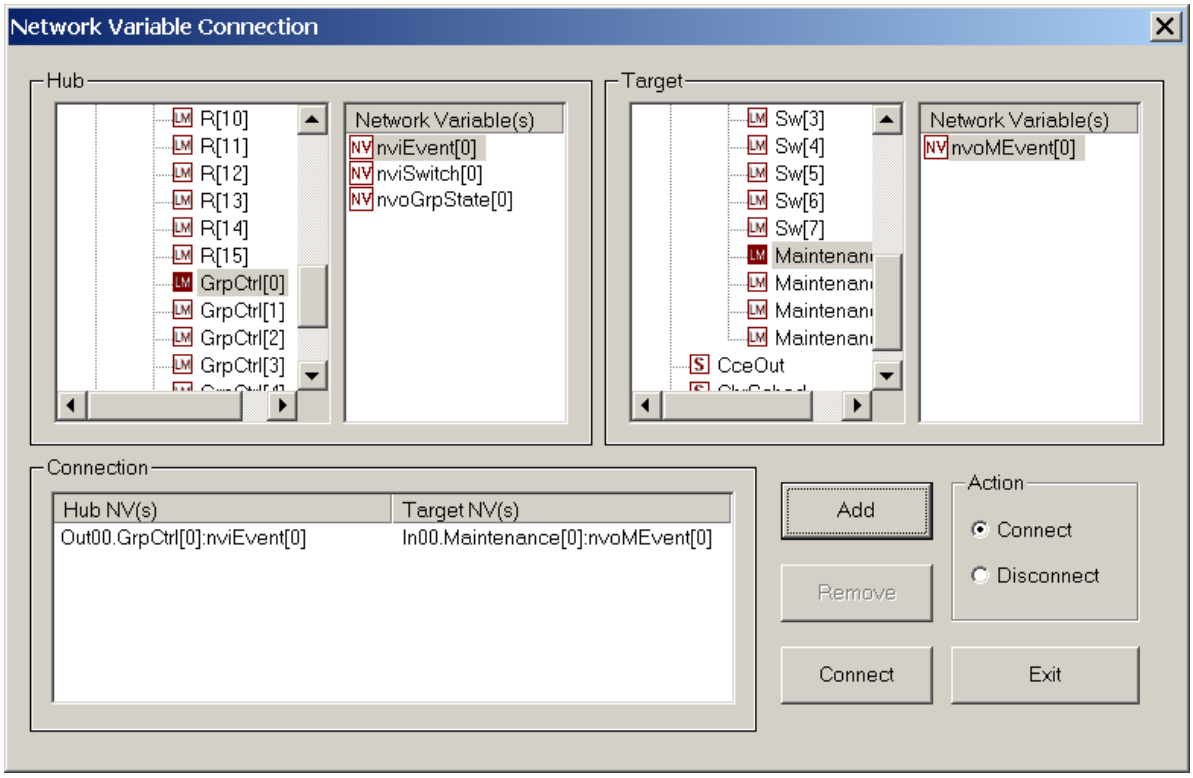
5.12.1. LNS server credits

The **LNS Server Credits** screen displays how many Echelon credits are available. Initially, a minimum of 64 credits is available. Each device commissioned by the software consumes one credit. Remember to uninstall nodes adequately in order to recover credits for the unused cards. When there are no more credits left, there is a 15-day deadline to get more. Since it is impossible to open the database once the update period is over, it is very important to renew the credits as soon as possible by contacting a Gentec sales representative.



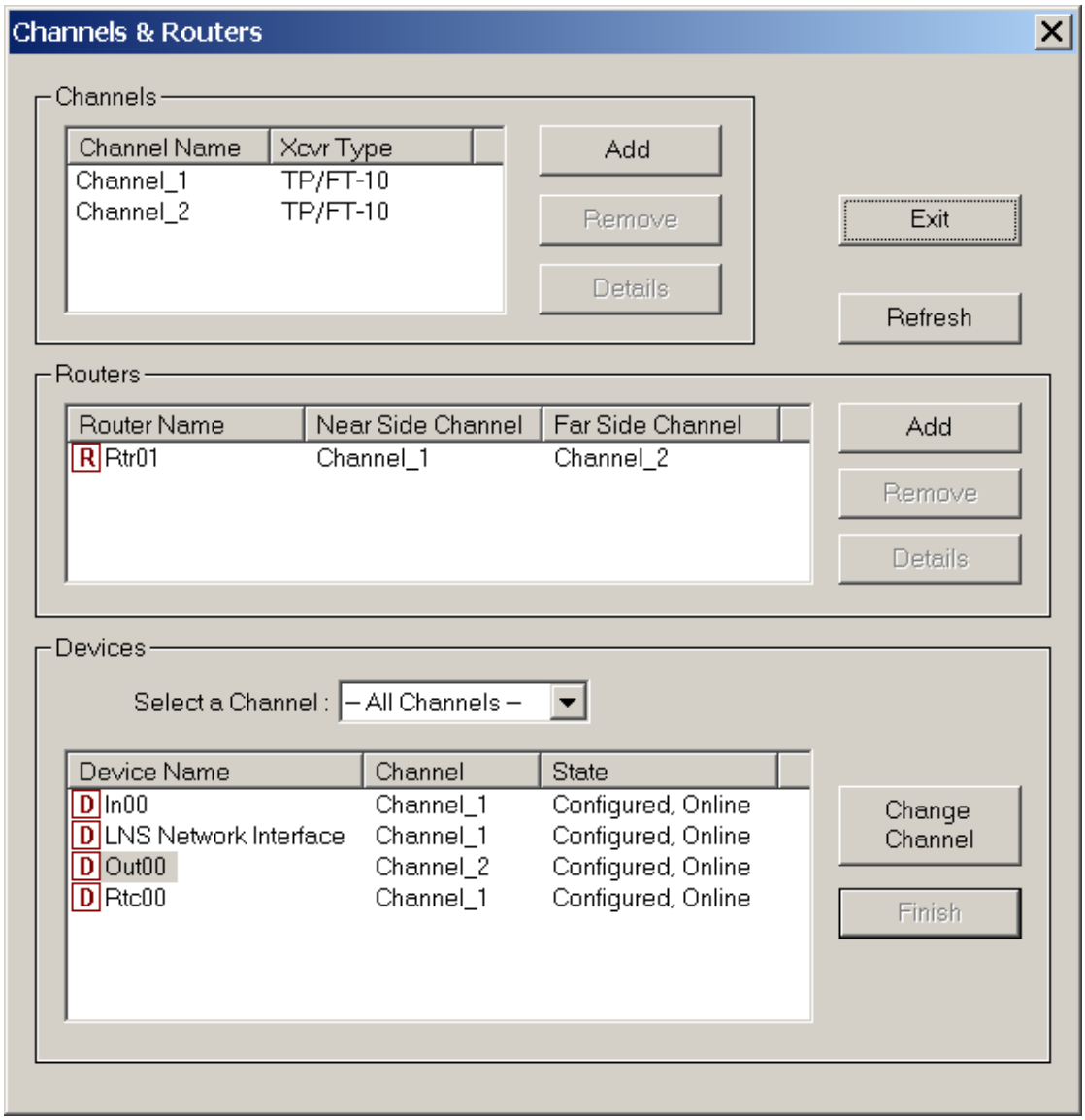
5.12.2. NV Connection

Usually, the group wizards (relay and maintenance) handle all the Network Variable (NV) connections. Occasionally, there might be a very special system configuration for which the current group wizards are not adequate. The **NV Connection** tool allows the connection (and disconnection) of all network variables within the system.



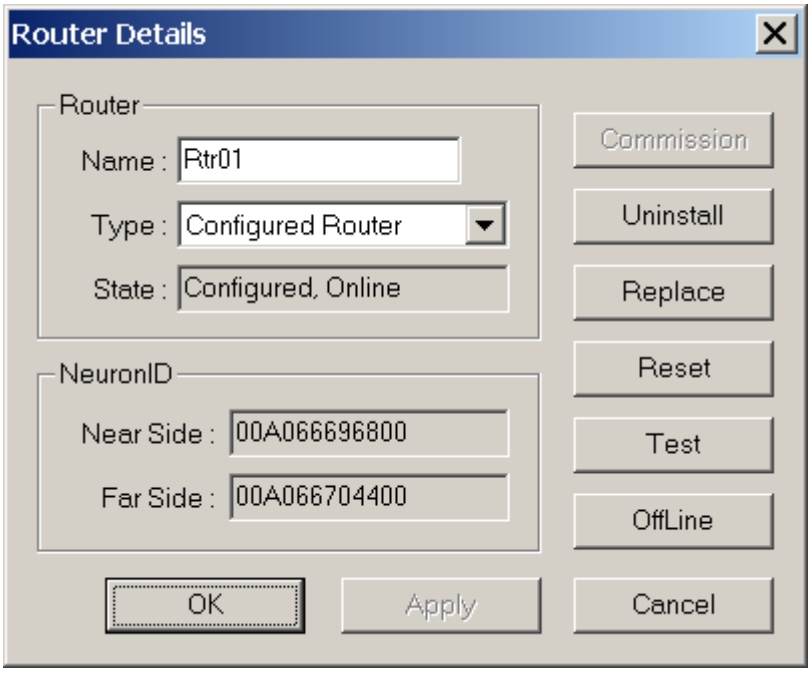
5.12.3. Channels & Routers

This tool allows high-level users to build more complex network than the simple twisted pair.



The **Channels** section is used for creating, removing and modifying channels. Each channel is defined by a unique name and a transceiver type. These parameters can be modified at any time. A channel cannot be removed if it still contains objects (devices or routers).

In the **Routers** section, there is a list of all defined routers and buttons to add and remove routers. In the list, the **Near Side Channel** is the closest channel to the network interface; i.e. the channel that can be reached directly without going thru the router (a direct path may include other routers). Thus, the **Far Side Channel** is the other router channel. The **Details** button opens a dialog box that gives more information on the selected router and allows for some operations on it.

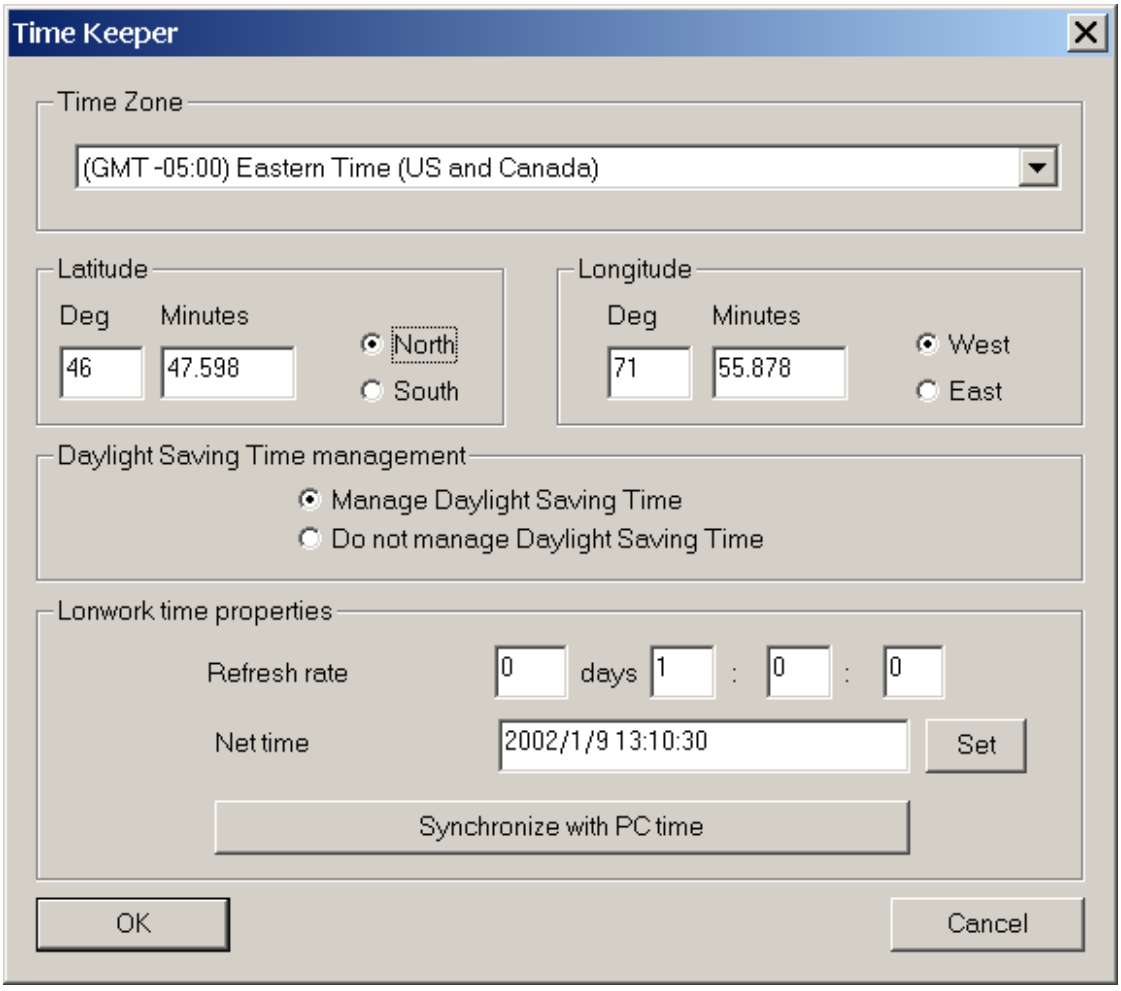


In the **Devices** section, devices are listed according to their connecting channel. This section also offers the tool to move devices from one channel to another. A device move is a three step procedure:

- Select the device, click the **Change Channel** button and choose the new channel from the list. At this point, the device is put in an **Unconfigured** state and still shows as being connected to its old channel.
- Physically connect the device to its new channel.
- Select the device from the list and click on the **Finish** button.

NOTE: This procedure may be applied to many devices at once.

5.12.4. System time



The more precise the data you enter, the more precise the astronomical time. Make sure you enter accurate data.

- The **Time Zone** is where you are located in relation to the Greenwich meridian. Quebec is in the Eastern Time zone: (GMT – 05: 00).

- Enter the **Latitude** and **Longitude**. These coordinates (and the time zone) are used for the sunrise and sunset computation. Initially, they are the Quebec City coordinates. For a more accurate sunrise and sunset time, these coordinates should be set to the system location.

- The **Daylight Saving Time manage** section offers the option of automatically taking charge of the time change.

- The **LonWork time properties** section includes two elements: the refresh rate and the net time. The **Refresh Rate** is to be entered when there are many ChrSched card on the same network. One of these cards is the master on which the others adjust their time. The refresh rate is the exact moment when the cards resynchronize themselves with the master

ChrSched card, according to the following parameters: day, hour, minute, and second. This way, the synchronization takes place at the specified interval.

- The **Net Time** displays the time on the card. Use the **Set** button to set the system's time and date.
- **Synchronize with PC time** makes it possible to set the time and date for the network at the same time and date as the computer.
- Clicking **OK** confirms the data entered.

5.12.5. Resynchronize

The **Resynchronize** function allows resynchronizing a graphic page and the corresponding groups following changes in the database. Resynchronize when relays are in an indeterminate status (red) due to changes made to the database.

5.12.6. Password Modification

This function allows modifying the different system passwords.

5.12.7. View, add and remove background

To install a console background, select **View**, **Add background**. Only bitmap pictures (.bmp) are recognized.

To uninstall the background, select **View**, **Remove background**.

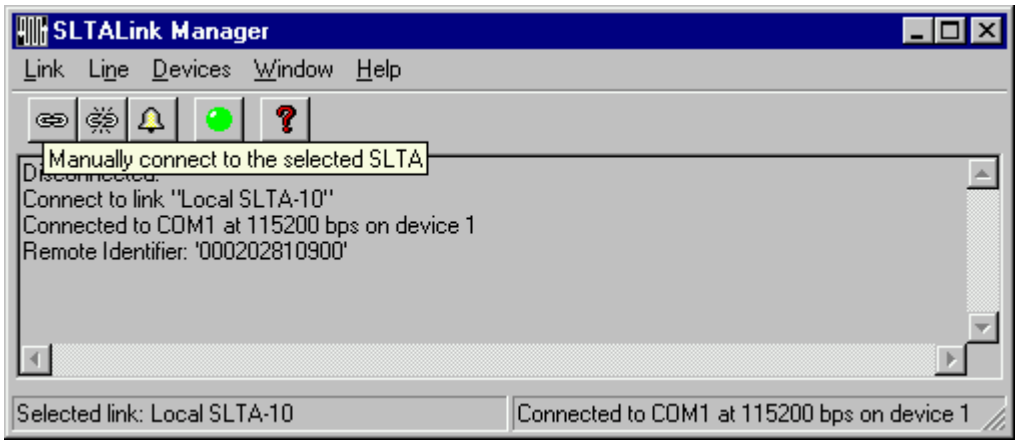
6. TROUBLESHOOTING

The first steps in the verification process always remain the same. Start with these steps before going on to other things.

- Check whether all the cards are power-supplied (LED +5V is on) and whether they are configured and active.

6.1. The program will not open.

- Make sure the network interface is operational. In the case of an SLTA interface, check whether it is properly connected. To do so, go to the **Start/ Programs/LonWorks SLTA-10/SLTALink Manager** menu: in the **SLTALink Manager** window, check the color of the circle in the fourth icon: green means that the SLTA is operational; red and yellow mean that it is not operational. If such is the case, try to connect it by clicking on the first icon (with the closed chain link), then, check the SLTA cable and the configuration of the serial ports in the **Link/SelectAction/Edit** menu.



- Check whether the password is valid.

6.2. The database will not open.

- Check whether the network interface is operational. In the case of an SLTA interface, check whether it is properly connected.

6.3. The sequences do not follow the programming.

- Check whether the database is integrated into the network.
- Check the data entered in the Delay On, Delay Off, Warning and Time On Extension fields.
- Check the connections of the switches and the relays on the CDA, CCEIn and CCEOut cards.
- Check whether the network clock has the right time and date. It should be synchronized with those of the computer.

6.4. A relay group will not work.

- Check whether the database is On Net.
- Check the data entered in the Delay On, Delay Off, Warning and Time On Extension fields.
- Check whether the switch or the scheduler pertaining to this operation is properly programmed for the group.

6.5. A relay within a group will not work.

- Make sure that the relay is part of this group.
- Check whether the connection is adequate.

6.6. One or more switches will not activate their groups.

- Check the switch connections. To do so easily, check the LED Ini on the corresponding input card. It must be on when the switch changes status. If the LED Ini does not react to changes of status, it means that either the connection or the switch is out of order. If both are operational, change the input card.

7. LIGHTING CONSOLE PRODUCTS

7.1. Power Distribution Card

Power Distribution Card # Gentec 18603-01

7.2. Lighting Control Card

Lighting Control Card input # Gentec 18429-02

Lighting Control Card Output (2-wire relays) # Gentec 18429-01

Lighting Control Card Output (3-wire relays) # Gentec 18429-03

7.3. Network Scheduler Card

Network Scheduler Card – node option # Gentec 18600-00

Network Scheduler Card – RTC and converter option # Gentec 18600-01

Network Scheduler Card – serial communication interface option # Gentec 18600-02