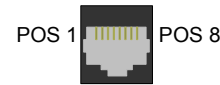


Figure 1. Home Lighting Controller



- Position 1: 12VDC
- Position 2: Input 1
- Position 3: Input 2
- Position 4: ALC Comm -
- Position 5: ALC Comm +
- Position 6: Input 3
- Position 7: Input 4
- Position 8: GND

Figure 2. ALC COMM Connector Pin-Out

INTRODUCTION

The part no. 364644-01 Home Lighting Controller provides high-speed, two-way communications with OnQ's Advanced Lighting Control (ALC) switches and I/O Module. The Home Lighting Controller's flexible interface and control features enable it to function as a standalone lighting system controller for basic convenience and security lighting applications. Alternatively, the Home Lighting Controller can interface to personal computers and automation system controllers to provide fully automated whole-house lighting control functions.

CONVENIENCE AND SECURITY LIGHTING APPLICATIONS

In a basic system installation, ALC 4-Button Scene Switches, Program Switches and 4-Button Keyfob RF remote controls provide an interface to the homeowner for control of lighting within a room, multiple rooms or even lights and appliances throughout the entire home. The Home Lighting Controller incorporates features that permit ALC Scene Switches, Program Switches and OnQ Keyfob RF Remote Controls to automatically learn the light level settings of ALC switches and I/O Module outputs throughout the home. By simply pressing and holding a button, the homeowner can program groups of lights set to any desired level. Subsequently, each time the switch button is pressed, all associated ALC switch and I/O Module outputs will automatically resume their programmed levels. The Home Lighting Controller provides programmable inputs and also accepts X10 power line carrier lighting commands to enable easy interfacing to any security system.

ADVANCED CONTROL AND AUTOMATION APPLICATIONS

The Home Lighting Controller can be expanded, via the part no. 364698-01 the Serial Expansion Module, to include a serial communications port for connection to serial communicating keypads, IR controls, automation systems, personal computers and home theater systems. Control and programming of up to sixteen (16) lighting scene programs is supported via simple ASCII character commands. Since, all ALC lighting switches can both receive and transmit data via the Home Lighting Controller, the press of an ALC switch can initiate system events for program control of automation macros, security levels, temperature set-points and entertainment equipment settings. When connected to an automation controller, ALC switches can be controlled based on time-of-day, system modes and security related events. Consult OnQ document no. 1307659, the Home Lighting Controller Technical Guide, for detailed information on supported communication protocols.

INSTALLATION

The Home Lighting Controller mounts to an OnQ enclosure or network center bracket. Each Home Lighting Controller module includes a 12VDC, 800mA power supply. The power supply should be plugged into an uninterrupted 120VAC outlet.

CONTROL CONNECTIONS

The Home Lighting Controller features support for a total of 124 ALC switches. Positions 4 and 5, of the ALC COMM port provide connections for units 1 thru 31 (ALC Branch1) and up to 500 feet of category rated cable.

Positions 1 and 8, of the ALC COMM port provide connections for distribution of 12VDC power to external devices such as the part no. 364677-01 ALC Branch Hub, part no. 364678-01 I/O module and part no. 364697-01 RF Remote Control. Current draw from all connected external devices should not exceed 600mA.

Positions 2, 3, 6, and 7, of the ALC COMM port provide connections for external device outputs. These four logic-level inputs simulate the four buttons of an ALC Scene Switch. These inputs are referred to as Virtual Scene Switch inputs. Each one of the four inputs can have a scene assigned to it. The external device may provide dry contact or voltage outputs (5-12VDC) to the Home Lighting Controller's inputs. The external device's outputs must be configured as normally open/logic high (5-12VDC). A virtual switch press is registered when the external device's outputs become closed/logic low (<0.8VDC) for at least 100msec. All contact closures or voltages are applied between each input connection and position8, GND.

OPERATION

Upon powering up the Home Lighting Controller, the STATUS LED indicator will blink at a rate of approximately 1 blink per second. If the STATUS indicator remains On or Off, it is an indication of a fault. In the event of a fault, check all connections and power to the Home Lighting Controller.

Subsequent to making any alterations to the system, such as an address change to an ALC switch, the Home Lighting Controller should be reset. Resetting can be accomplished either by removing power from the Home Lighting Controller or by pressing the RESET button.

Note: Remove power to the controller prior to connecting new devices. Verify all connections prior to restoring power

The ALC ACTIVITY LED indicator serves as a diagnostic feature. The ALC ACTIVITY LED will blink whenever the controller detects any system activity. The LED will blink when activity is detected at any of the controller's four inputs. The LED will also blink when X10 commands are received at the X10 COMM port. The ALC ACTIVITY LED is particularly useful in verifying proper connection of ALC switches and I/O modules. When any ALC switch button is pressed or I/O Module input is activated, the ALC ACTIVITY indicator will blink in response to the event.

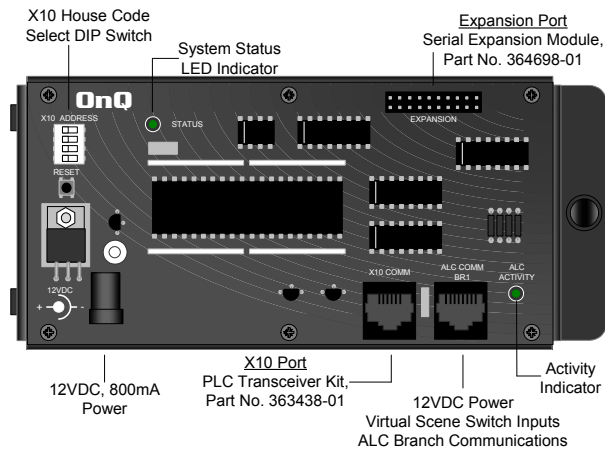


Figure 3. Home Lighting Controller Features

LOCAL LIGHTING SCENE PROGRAMMING

The Home Lighting Controller incorporates features that permit ALC Scene Switches, Program Switches, Virtual Scene Switch inputs and I/O module inputs to learn the light level and output settings of ALC Dimmers, Relay switches and I/O Modules. A total of 64 scenes can be stored in the Home Lighting Controller. All memorized lighting and output levels are retained in the Home Lighting Controller's memory (EEPROM). All scene programs are preserved in the event of a power outage.

The Home Lighting Controller is put into "Scene Learning Mode" in order to define the ALC light levels and I/O Module output states for a local lighting scene. The user puts the system into "Scene Learning Mode" in one of four ways:

- 1) press and hold an ALC Scene Switch button
- 2) press and hold the On or Off position of an ALC Program Switch
- 3) press and hold the PROGRAM button of an I/O Module
- 4) pull a Virtual Scene Switch input low (GND to 0.8VDC)

The button or input must be held for approximately 15 seconds. The LED indicator on the ALC Scene Switch (ver1.4 or greater) or the STATUS indicator on the I/O Module blinks continuously when the button has been held long enough. Additionally, the ALC ACTIVITY indicator on the Home Lighting Controller will blink once to acknowledge that "Scene Learn Mode" has been entered.

After the 15 seconds, the user should release the button or input to allow it to return to its normal state. The user then defines all lights and outputs to be controlled by the scene. The user must press each ALC Dimmer or Relay Switch or change the state of each I/O Module output if it is to be included in the new scene program. The final state of the selected ALC switches or I/O Module outputs will be stored in the scene. The I/O Module's outputs are changed by holding the I/O Module's OUTPUT SELECT button and then activating either Input1 or Input2 to change the corresponding Output1 and Output2 of the I/O Module to the desired level for the scene.

After setting all lighting and output levels that are to be included in the new scene program, the user should momentarily press and release the button or input to assign the scene to that button or input. The LED's on ALC Scene Switches and I/O Modules will stop blinking when the system leaves the Scene Learning Mode. Programming of the new lighting scene is now completed and stored in EEPROM memory.

While the system is in Scene Learning Mode, no other system functions may be performed during this time. If the user does not complete programming of the scene within 10 minutes, the system automatically leaves the Scene Learning Mode and no changes are made to any scenes.

RESTORING LOCAL LIGHTING SCENES

To restore a locally programmed lighting scene, the user momentarily presses and releases the desired Scene Switch or Program Switch or activates the I/O Module or Virtual Scene Switch input. All lights and outputs belonging to that scene are then set to their programmed levels. Lights not belonging to the scene are not affected when the scene is restored.

RE-PROGRAMMING LOCAL LIGHTING SCENES

To change the devices or levels that are included in a scene, the user simply repeats the scene programming process. The levels for the new scene will replace the old ones. To remove a scene from any button or input, simply enter Scene Learning Mode then press that button or input again without changing any light or outputs levels in the system. That button or input will then be assigned an "empty" scene.

X10 COMPATIBILITY

The Home Lighting Controller can send and receive X10 messages when installed in combination with an OnQ part no. 363438-01 Power Line Transceiver. The transceiver should be plugged into an uninterrupted 120 VAC outlet. The modular cable end plugs into the Home Lighting Controller's X10 COMM modular connector port.

The X10 ADDRESS dip-switch on the Home Lighting Controller is set to select the base house code to be used for X10 communications. The following X10 commands are interpreted by the Home Lighting Controller and re-transmitted to ALC Dimmer and Relay Switches:

"Unit On", "Unit Off", "Unit Bright", "Unit Dim", "All Lights On", "All Lights Off" and "All Units Off"

The Home Lighting Controller's 4-position X10 ADDRESS dip-switch may be set for a value from 0 to 15 (0000 to 1111.) This corresponds to an X10 base house code of A to P. Example: If the dip-switch setting is 0001, the base house code is "B".

The Home Lighting Controller checks the house code and unit code of each received X10 command and subsequently translates each X10 command to corresponding ALC Dimmer and Relay Switch commands. This allows an X10 controller or security panel to be used for controlling ALC lights. The X10 ADDRESS dip-switch setting determines the correlation (mapping) between the address in an X10 command and an ALC address. X10 addresses consist of a house code ranging from "A to P" and a unit code ranging from "1 to 16". ALC devices are addressed on four branches (branch 1 thru branch 4) with up to 31 ALC devices per branch (address 1 thru 31).

Examples: If the Home Lighting Controller's base house code is set to "A" (0000), then an X10 "A1" command will also be sent by the Home Lighting Controller to the ALC Dimmer or Relay Switch at branch 1, address 1. An X10 "A16" command is mapped to the ALC Dimmer or Relay Switch at ALC branch 1, address 16. An X10 "B1" command is mapped to the ALC switch at ALC branch 1, address 17. An X10 "B15" command is mapped to the ALC Dimmer or Relay Switch at ALC branch 1, address 31. When the X10 ADDRESS dip-switch is set to house code "A" (0000) and the X10 "A2 On" command is received, the Home Lighting Controller sends an ON message to the ALC device at branch 1, address 2, if that device is an ALC Dimmer or Relay Switch.

The Home Lighting Controller will not respond to X10 commands that would correspond to ALC address 32. For example, if the Home Lighting Controller's base house code is set to "A" then X10 "B16", "D16", "F16" and "H16" commands are not mapped to ALC devices since there are only 31 ALC devices per branch. Additionally, if the X10 ADDRESS dip-switch is set to "A" (0000) and an X10 command house code "P", "All Lights On" is received, none of the ALC lights in the system will be affected since house code "P" is not mapped to any ALC Dimmer or Relay Switches.

Each X10 Bright or Dim command mapped to an ALC Dimmer will cause the dimmer to increase or decrease its brightness level by 10 units. The ALC Dimmer's brightness level ranges from 0 (Off) to 127 (full On).

Example: If an X10 "A3 Bright" command is received and there is an ALC Dimmer at branch 1, address 3 and is initially at a brightness level of 85, then the Dimmer's brightness will be ramped up to a level of 95.

Holding the Bright or Dim buttons on an X-10 controller will typically send a series of Bright or Dim commands, and each one received will change the brightness of the corresponding ALC Dimmer by 10 units until the minimum or maximum brightness is reached.

The X10 "All Lights ON", "All Lights OFF", and "All Units OFF" commands are sent by an X10 controller for a specific house code, such as house code "B". The Home Lighting Controller checks the X10 command to see if any ALC devices are mapped to that particular house code. If so, then ALC modules with node numbers from 1 to 30 on all four ALC branches are turned On or Off. ALC Modules set to address 31 are NOT affected by the X10 "All On" or "All Off" commands. Any ALC Dimmers or Relay Switches that should NOT be affected by an X10 "All On" or "All Off" command should be set to address 31.) If no ALC Dimmer or Relay Switches are mapped to the house code defined in the "All On" or "All Off" command, the command is ignored.

ALC SCENE SWITCH X10 CONTROL

In addition to controlling local lighting scene programs, any ALC Scene Switch set to address 30 or 31 will send X10 commands using the base house code setting of the Home Lighting Controller's X10 ADDRESS dip-switch.

An ALC Scene Switch set to address 30 or 31, will send X10 commands to unit code 1 and to all units whose house code is equal to the base house code setting of the Home Lighting Controller's X10 ADDRESS dip-switch. The pre-defined X10 commands are as follows:

- Button No. 1 = Base House Code, Unit Code 1 ON
- Button No. 2 = Base House Code, Unit Code 1 OFF
- Button No. 3 = Base House Code, All Lights ON
- Button No. 4 = Base House Code, All Units OFF

Example, if the base house code is "B", Scene Switch address 30 or 31 sends X10 commands to turn device "B1" On and Off and to turn ALL X-10 lights set to house code "B" On and Off. The ALC Scene Switch may also have a local lighting scene assigned to each of its buttons in addition to these X10 functions.

Table 1 shows the X10 vs. ALC address correlations (mapping). To use the tables, select the column (A-P) corresponding to the Home Lighting Controller's dip-switch setting for the base house code. The X10 message address is shown in the left-hand column and the corresponding ALC branch/address is in the selected column. This mapping is valid only for ALC Relay Switches and ALC Dimmers. X10 commands are not interpreted and transmitted to other types of ALC devices.

SERIAL COMMUNICATIONS AND INTERFACING

The Home Lighting Controller provides an expansion port for connection of a Serial Expansion Module, part no. 364698-01. The Serial Expansion Module enables interfacing to personal computers and host control systems. In this manner, the Home Lighting Controller may function as a lighting system manager in an integrated system environment. The serial communications port may be configured for either 9600 bps RS-232 or RS-485 operation. When connected to a host controller's serial port, the Home Lighting Controller provides direct access to all ALC lighting control features. The Home Lighting Controller provides two serial communications protocols; ASCII-Link and ALC-Link. ASCII-Link is a low level ASCII character based communications protocol. ALC-Link is a high level communications protocol intended for incorporation into 3rd party controller firmware. This protocol provides access to all ALC switch operational features and individual switch status information. Refer to the Part No. 1307659 Developers Guide for detailed protocol information.

PC PROGRAMMING

The OnQ SceneTech PC Software, part no. 364630-01, provides useful features to allow testing and verification of Home Lighting Control system installations. The SceneTech software also provides installers with the ability to edit "Local" lighting scene programs as well as create and edit "Global" lighting scene programs. The OnQ SceneTech Software operates within any Windows 95 or later PC system environment.

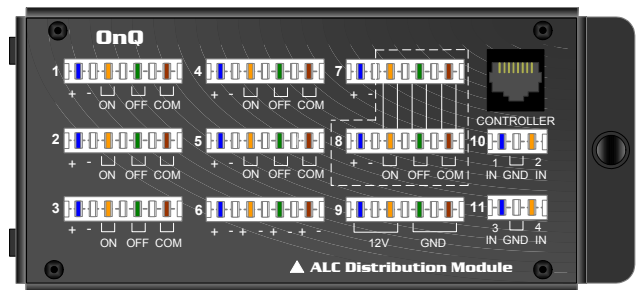


Figure 4. Wiring Distribution Module

WIRING DISTRIBUTION

The part no. 364645-01 Wiring Distribution Module is intended for use with the Home Lighting Controller. The module supports direct wiring of ALC Dimmers, Relay Switches, Auxiliary (slave) Switches, Scene Switches, Program Switches, I/O Modules, ALC Branch Hubs and RF Remote Controls. Direct wiring is conducive to testing and quick isolation of faults when they occur. A modular patch cable (included) connects the module's CONTROLLER jack to the Home Lighting Controller's ALC COMM jack. All connection points consist of 110 style IDC connectors for connection of category 3, 5 or 5E cables.

WARRANTY

OnQ warrants to the end-user, each new ALC product to be free of defects in materials or workmanship for a period of one year from the date of original purchase from OnQ or its authorized reseller or installer. Each product is deemed warrantable under conditions of normal use and when installed and operated within OnQ specifications and in accordance with the applicable National Electrical Code and Safety Standards of Underwriters Laboratories. When determined to be warrantable, OnQ shall at its option and expense, replace any defective product with a new or reconditioned product. OnQ will continue to warrant any replaced product for a period of ninety (90) days from shipment, or through the end of the original warranty period, which ever is longer.

| X10 COMMAND ADDRESS | Base House Code Setting of X10 ADDRESS Dip-Switch | | | | | | | |
|-----------------------------|---|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | A (0000) | B (0001) | C (0010) | D (0011) | E (0100) | F (0101) | G (0110) | H (0111) |
| CORRESPONDING ALC ADDRESSES | | | | | | | | |
| A1-A15 | Br1/Ad1-Br1/Ad15 | | | | | | | |
| A16 | Br1/Ad16 | | | | | | | |
| B1-B15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1-Br1/Ad15 | | | | | | |
| B16 | | Br1/Ad16 | | | | | | |
| C1-C15 | Br2/Ad1-Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1-Br1/Ad15 | | | | | |
| C16 | Br2/Ad16 | | Br1/Ad16 | | | | | |
| D1-D15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1-Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1-Br1/Ad15 | | | | |
| D16 | | Br2/Ad16 | | Br1/Ad16 | | | | |
| E1-E15 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1-Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1-Br1/Ad15 | | | |
| E16 | Br3/Ad16 | | Br2/Ad16 | | Br1/Ad16 | | | |
| F1-F15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1-Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1-Br1/Ad15 | | |
| F16 | | Br3/Ad16 | | Br2/Ad16 | | Br1/Ad16 | | |
| G1-G15 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1-Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1-Br1/Ad15 | |
| G16 | Br4/Ad16 | | Br3/Ad16 | | Br2/Ad16 | | Br1/Ad16 | |
| H1-H15 | Br4/Ad17-Br4/Ad31 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1-Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1-Br1/Ad15 |
| H16 | | Br4/Ad16 | | Br3/Ad16 | | Br2/Ad16 | | Br1/Ad16 |
| I1-I15 | | Br4/Ad17-Br4/Ad31 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1-Br2/Ad15 | Br1/Ad17-Br1/Ad31 |
| I16 | | | Br4/Ad16 | | Br3/Ad16 | | Br2/Ad16 | |
| J1-J15 | | | Br4/Ad17-Br4/Ad31 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1-Br2/Ad15 |
| J16 | | | | Br4/Ad16 | | Br3/Ad16 | | Br2/Ad16 |
| K1-K15 | | | | Br4/Ad17-Br4/Ad31 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 |
| K16 | | | | | Br4/Ad16 | | Br3/Ad16 | |
| L1-L15 | | | | | Br4/Ad17-Br4/Ad31 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 |
| L16 | | | | | | Br4/Ad16 | | Br3/Ad16 |
| M1-M15 | | | | | | Br4/Ad17-Br4/Ad31 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 |
| M16 | | | | | | | Br4/Ad16 | |
| N1-N15 | | | | | | | Br4/Ad17-Br4/Ad31 | Br4/Ad1-Br4/Ad15 |
| N16 | | | | | | | | Br4/Ad16 |
| O1-O15 | | | | | | | | Br4/Ad17-Br4/Ad31 |
| O16 | | | | | | | | |
| P1-P15 | | | | | | | | |
| P16 | | | | | | | | |

| X10 COMMAND ADDRESS | Base House Code Setting of X10 ADDRESS Dip-Switch | | | | | | | |
|-----------------------------|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | I (1000) | J (1001) | K (1010) | L (1011) | M (1100) | N (1101) | O (1110) | P (1111) |
| CORRESPONDING ALC ADDRESSES | | | | | | | | |
| A1-A15 | | | | | | | | |
| A16 | | | | | | | | |
| B1-B15 | | | | | | | | |
| B16 | | | | | | | | |
| C1-C15 | | | | | | | | |
| C16 | | | | | | | | |
| D1-D15 | | | | | | | | |
| D16 | | | | | | | | |
| E1-E15 | | | | | | | | |
| E16 | | | | | | | | |
| F1-F15 | | | | | | | | |
| F16 | | | | | | | | |
| G1-G15 | | | | | | | | |
| G16 | | | | | | | | |
| H1-H15 | | | | | | | | |
| H16 | | | | | | | | |
| I1-I15 | Br1/Ad1 - Br1/Ad15 | | | | | | | |
| I16 | Br1/Ad16 | | | | | | | |
| J1-J15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1 - Br1/Ad15 | | | | | | |
| J16 | | Br1/Ad16 | | | | | | |
| K1-K15 | Br2/Ad1 - Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1 - Br1/Ad15 | | | | | |
| K16 | Br2/Ad16 | | Br1/Ad16 | | | | | |
| L1-L15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1 - Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1 - Br1/Ad15 | | | | |
| L16 | | Br2/Ad16 | | Br1/Ad16 | | | | |
| M1-M15 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1 - Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1 - Br1/Ad15 | | | |
| M16 | Br3/Ad16 | | Br2/Ad16 | | Br1/Ad16 | | | |
| N1-N15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1 - Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1 - Br1/Ad15 | | |
| N16 | | Br3/Ad16 | | Br2/Ad16 | | Br1/Ad16 | | |
| O1-O15 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1 - Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1 - Br1/Ad15 | |
| O16 | Br4/Ad16 | | Br3/Ad16 | | Br2/Ad16 | | Br1/Ad16 | |
| P1-P15 | Br4/Ad17-Br4/Ad31 | Br4/Ad1-Br4/Ad15 | Br3/Ad17-Br3/Ad31 | Br3/Ad1-Br3/Ad15 | Br2/Ad17-Br2/Ad31 | Br2/Ad1 - Br2/Ad15 | Br1/Ad17-Br1/Ad31 | Br1/Ad1 - Br1/Ad15 |
| P16 | | Br4/Ad16 | | Br3/Ad16 | | Br2/Ad16 | | Br1/Ad16 |

Table 1. X10 vs. ALC Address Mapping