ENERGY SAVING LIGHTING CONTROLS

Intelligent Lighting Controls, Inc.

ILC Apprentice

USER GUIDE

Includes setup, installation, programming, and application information for the ILC Apprentice lighting controller in stand alone applications

www.ilc-usa.com

ILC Apprentice

USER GUIDE

Version 1A
1/1/05

Class A FCC Device Statement

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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Overview

The ILC Apprentice lighting controller is a microprocessor-based, programmable lighting controller capable of advanced lighting control in stand alone applications. You can program each of the controller inputs to control any or all of the relay outputs. This User Guide outlines the capabilities of the controller and its add on modules. The ILC Apprentice is UL and FCC approved for commercial and residential applications.

Structure

The major components making up the controller are:

- enclosure
- control transformer
- CPU board with integral keypad/display
- I/O board(s)
- lighting relays

Enclosure – The enclosure is rated NEMA 1. It is divided into a line voltage section and a low voltage section. The line voltage section contains the line voltage side of the control transformers and lighting relays. The low voltage section contains the Class 2 side of the lighting relays, transformer secondaries and electronic components. Enclosures are available in 5 sizes to accommodate 8, 16, 24, 32, 40 and 48 inputs, outputs, and lighting relays.

Transformer – A 24 VA multi-tap control transformer (120 or 277/24 VAC) provides the 16 VAC input to power the controller electronics and input/output board(s).

CPU Board – The CPU board provides the controller's intelligence and memory. Major components include:

- Keypad/display – 4-line LCD display and six durable, comfortable push buttons.
- *Power Supply* – converts the 16 VAC input to the +5, -5 and +24 VDC required by the controller logic and communications circuits. A power switch provides the means of energizing/de-energizing all controller electronics.
- *Communications* – RS-232 port, add-on card expansion socket.
- *Microprocessor* – executes the computer code and coordinates all controller functions including the controller real time clock.
- *PROM Chip* – contains the controller operating system and basic tasks.
- the *EEProm memory*– store the user-entered operating parameters.
- *Real time clock* – maintains time and date for up to 30 days without power.

I/O Board(s) – Each I/O board provides eight (8) switch inputs and relay outputs, status pilots and override switches. Major components include:

- *Switch Inputs* – can accept input from either 2- or 3-wire momentary or maintained dry contact devices. Each input has two associated LEDs (light emitting diodes). The ON LED lights when a closure is sensed between the ON and COMMON terminals. The OFF LED lights when a closure is sensed between the OFF and COMMON terminals. Each switch input features a switch pilot LED, which can be programmed to track the state of a single relay, relay group or preset. The inputs are optically isolated, noise- and surge-resistant. A switch and pilot may be located up to 1500 feet from the controller, provided you use a minimum of 18 gauge wire.
- *Relay Outputs* – Each optically isolated output switches its associated lighting relay ON and OFF. Each output has an associated LED. The LED lights when the output switches the relay ON.
- *Relays* – 20A at 120, 277 or 347 VAC magnetically latching relays maintain their state without power.
- *Override Switches* – Each relay output is equipped with an ON and an OFF override switch. These switches allow you to turn the associated lighting relay ON or OFF independent of any programming.

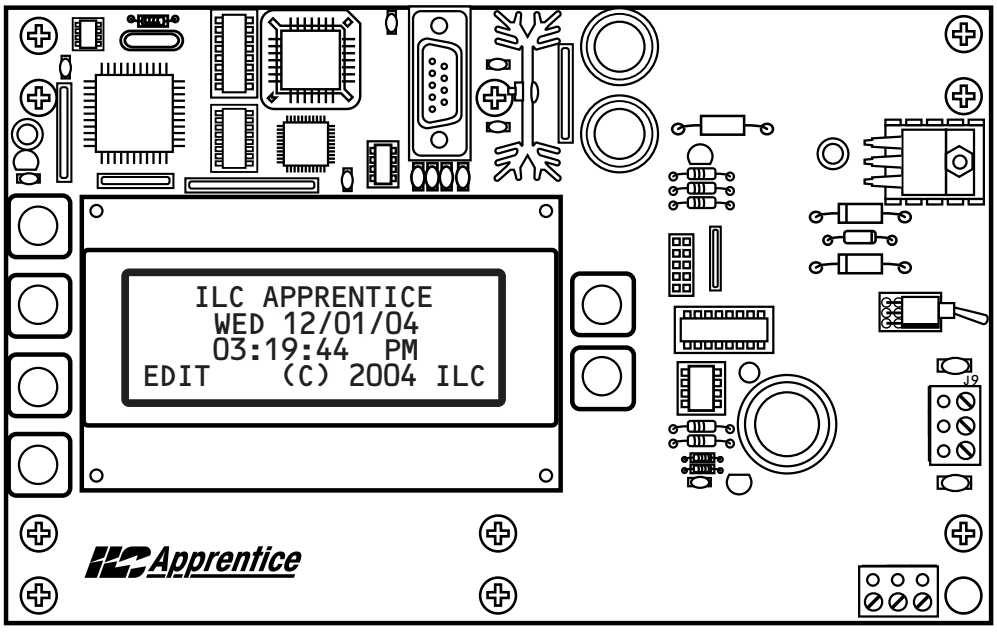
Section 1 Controller Description

Section 2 Installation

Section 3 Programming

Section 4 Appendix

Section 1
Controller Description



Section 1 Controller Description

Section 1 – Controller Description

Objectives

In this Section you will learn about the structure and configuration of the ILC Apprentice Controller.

Overview

The ILC Apprentice is a microprocessor-based lighting controller. You can program the ILC Apprentice to control lighting relays in response to switch signals sensed by its inputs and/or by time-based scheduling. The ILC Apprentice is UL approved and FCC certified for residential and commercial applications.

1.1 Controller Architecture

The major components making up the controller are: (See Figure 1.1.)

- enclosure
- control transformer
- CPU board
- I/O board(s)
- display/keypad
- lighting relays

1.1.1 Enclosure - The enclosure is rated NEMA 1. It is divided into a line voltage section containing the line voltage side of the control transformers and lighting relays and a low voltage section containing the Class 2 side of the lighting relays, transformer secondaries, and electronic components. Enclosures are available in 5 sizes to accommodate 8, 16, 24, 32, 40 and 48 inputs, outputs, and lighting relays. See (Table 1-1.) The ILC Apprentice is shipped to the job-site as a complete assembly. (See Figure 1-1, which illustrates a ILC Apprentice 8.)

1.1.2 Transformer - A multi-tap transformer (120 or 277/16 VAC) provides the 16 VAC input to power the controller electronics.

Model	# of Relays & I/O Points	Width	Height	Depth
Apprentice 8	1 to 8	18 Inches	15 Inches	4 Inches
Apprentice 16	1 to 16	18 Inches	24 Inches	4 Inches
Apprentice 24	1 to 24	24 Inches	36 Inches	4 Inches
Apprentice 32	1 to 32	24 Inches	36 Inches	4 Inches
Apprentice 40	1 to 40	24 Inches	48 Inches	6 Inches
Apprentice 48	1 to 48	24 Inches	48 Inches	6 Inches
Apprentice DS48	1 to 48*	20 Inches	28 Inches	6 Inches

**Outputs only*

Table 1.1 – ILC Apprentice Configurations

1.1.3 CPU Board – (See Figure 1.2.) The CPU board provides the controller's intelligence, memory, and communications capabilities. Major components include:

- *Power Supply* – converts the 16 VAC input to the +5, -5 and +24 VDC required by the controller logic and communications circuits. A power switch provides the means of energizing/de-energizing all controller electronics.
- *Communications* – RS-232 on-board port.
- *Micro-Processor* – executes the computer code and coordinates all controller functions including the controller real time clock.

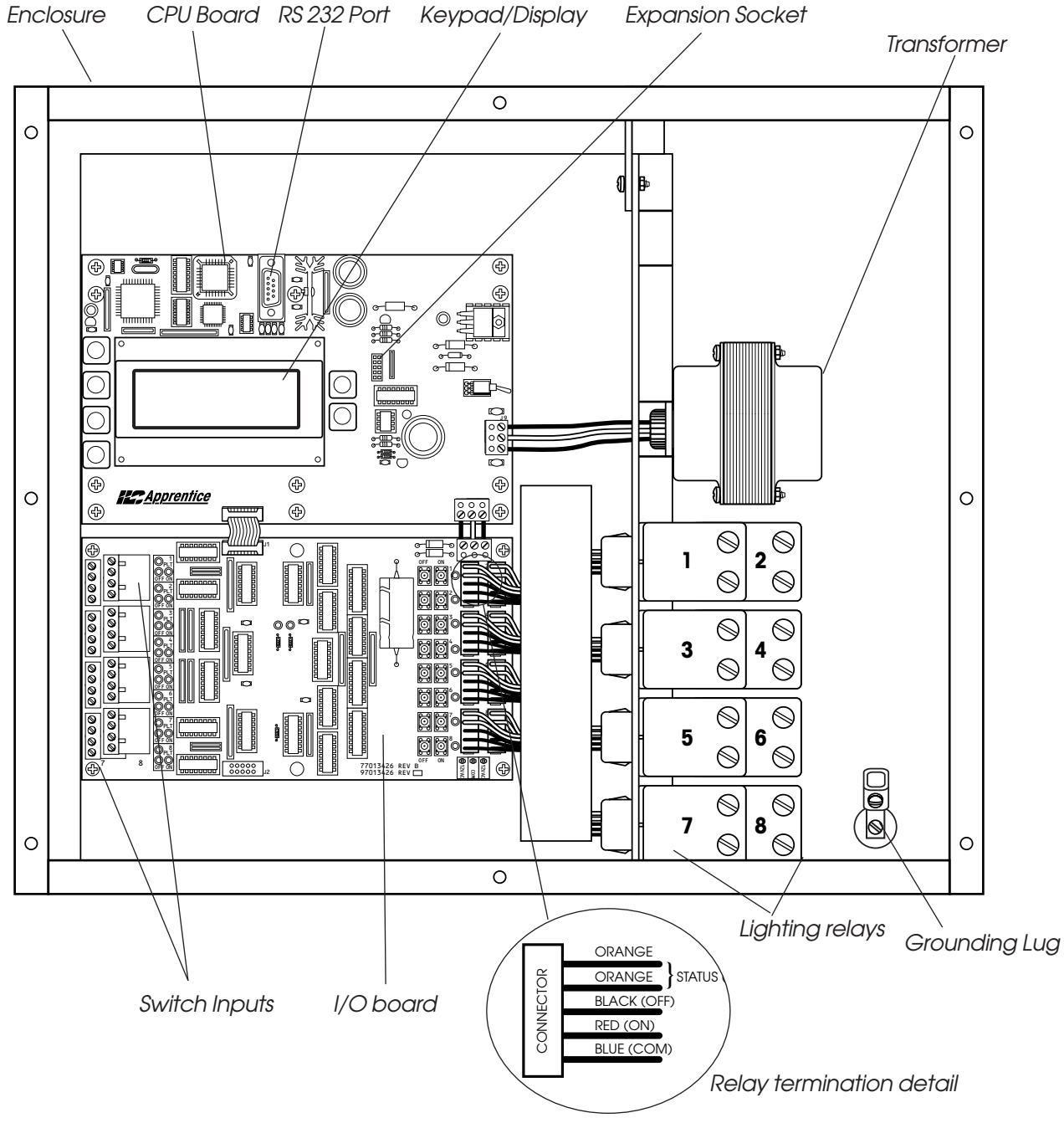


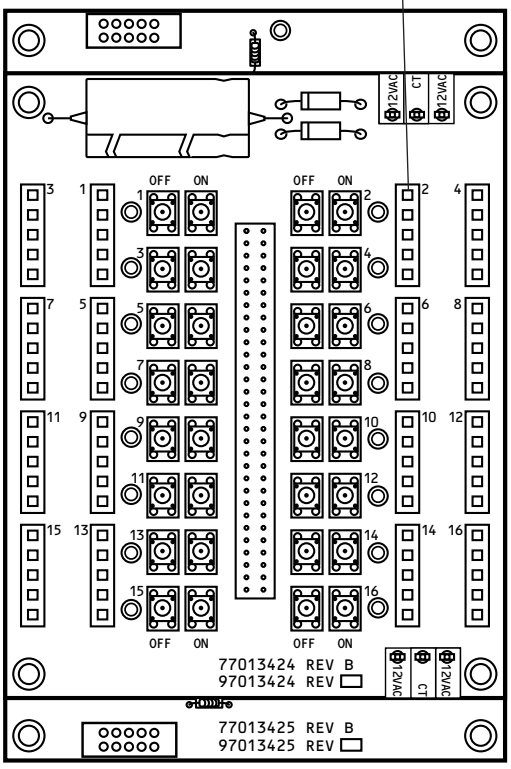
Figure 1.1 – ILC Apprentice 8 Controller

- *PROM Chip* – contains the controller operating system and basic tasks.
- the *EEProm memory*– store the user-entered operating parameters.
- *Real time clock* – maintains time and date for up to 30 days without power.

1.1.4 I/O Board(s) – Each I/O board adds eight (8) switch inputs and relay outputs. The ILC Apprentice double-sided version has 16 relay outputs per board and no switch inputs. Both inputs and outputs are optically isolated. Additional boards can be added to the appropriate size enclosure to provide a controller capacity of up to 48 switch inputs and 48 switch relay outputs. (See Figure 1.3, which illustrates a ILC Apprentice 32 and ILC Apprentice 48 double-sided version.) Major components include:

- *Switch Inputs* – The ILC Apprentice is designed to accomplish a wide variety of switch input types. Each switch input features an ON/OFF status pilot LED to indicate contact closure between ON and Common and OFF and Common. In addition, each switch input has an associated switch pilot LED output which can be programmed to track the state of a selected relay, relay group, or preset. See the Table 1.2 (next page)for a description of switch input types.
- *Relay Outputs* - each output switches its associated lighting relay ON and OFF. Each output has an associated LED (light emitting diode). The LED lites when the output switches the relay ON.
- *Relays* – 20A at 120, 277 or 347 VAC magnetically latching relays maintain their state without power.
- *Override Switches* – Each relay output is equipped with an ON and an OFF override switch. These switches allow you to turn the associated lighting relay ON or OFF independent of programming parameters.

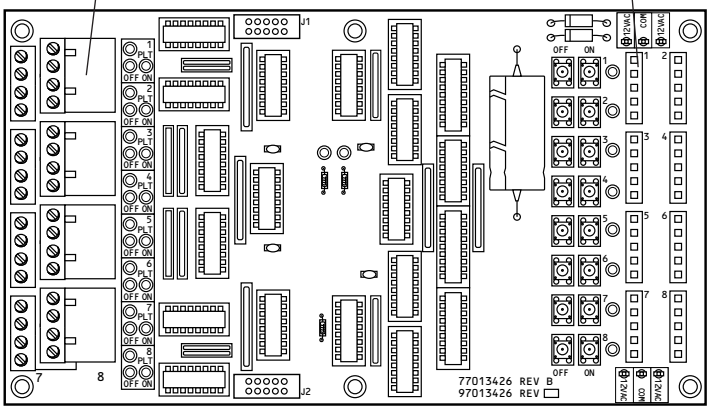
Relay outputs (16 per board)



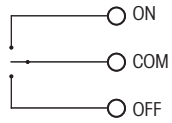
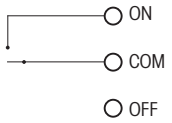
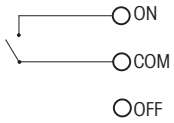
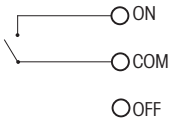
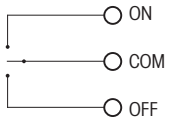
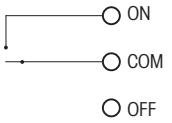
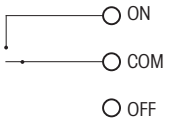
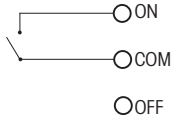
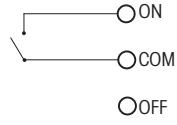
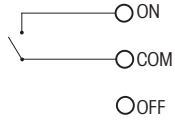
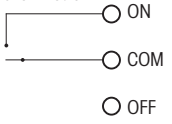
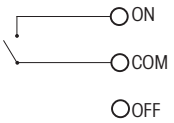
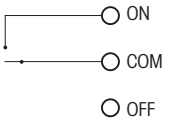
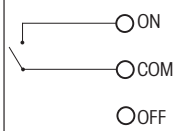
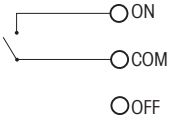
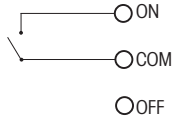
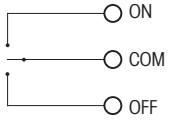
ILC Apprentice Double sided I/O board

Switch inputs and pilot outputs (8 per board)

Relay outputs (8 per board)



ILC Apprentice Standard I/O board

Momentary ON/OFF: When momentary contact is made between ON and COM, relay outputs controlled by this input are turned ON. When momentary contact is made between OFF and COM relay outputs controlled by this input are turned OFF.  MOMENTARY	***Momentary Push- Button:*** When momentary contact is made between ON and COM, relay outputs controlled by this input are turned ON and OFF alternately each time contact is made.  MOMENTARY	***Maintained ON/OFF:*** When contact is made between ON and COM relay outputs controlled by this input are turned ON. When contact is broken between ON and COM, relay outputs controlled by this input are turned OFF.  MAINTAINED	***Maintained Multi-Way:*** When contact is either made or broken between the ON and COM, relay outputs controlled by this input will be toggled between ON and OFF conditions. This function is similar to that of standard 3- and 4-way switches.  MAINTAINED	***Set Preset:*** When momentary contact is made between ON and COM, the selected preset will be activated.  MOMENTARY	***Timed ON/Cleaning Switch:*** When momentary contact is made between COM and ON, relay outputs are turned ON. When contact is broken, a timed ON duration is started from 5-999 minutes. Contact between OFF and COM will turn relays OFF.  MOMENTARY
Two-Step Group: When the switch is activated, group A (relay outputs) turn ON and group B (relay outputs) turn OFF. When the input is activated again, group A turn OFF and group B turn ON. The pattern repeats with successive switch activations.  MOMENTARY	***Four-Step Group:*** The first time the switch is activated, group A (relay outputs) turn ON and group B (relay outputs) turn OFF. The second time the switch is activated, group A turn OFF and group B turn ON. The third time, both groups turn ON. The fourth time, both groups turn OFF. The fifth actuation begins a repeat of the 4 steps.  MOMENTARY	***Input Disable:*** When contact is made between ON and COM, selected input or inputs will be ignored.  MAINTAINED	***Timer Disable:*** While contact is made between ON and COM, selected timer or timers will be ignored.  MAINTAINED	***Output Override:*** While contact is made between ON and COM, relay outputs controlled by this input are turned ON, OFF or held in their current state and all other control commands are ignored. **All inputs/timers are ignored for controlled relay outputs.**  MAINTAINED	***Photo Sensor Inputs:*** ILC Apprentice controllers can be connected to either momentary or maintained output photo sensors as shown below.  MOMENTARY Programmed as "Momentary"  MAINTAINED Programmed as "Maintained ON/OFF input"
Motion Sensor Inputs: ILC Apprentice controllers can be connected to either momentary or maintained output motion sensors as shown below.  MOMENTARY Programmed as "Momentary"  MAINTAINED Programmed as "Maintained ON/OFF input"	***Fire Alarm System Inputs:*** ILC Apprentice controllers can be easily connected to building Fire Alarm Systems to force selected controlled lighting circuits to the ON, OFF or HOLD state and lock out all other forms of control when a Fire Alarm signal is present (contacts CLOSED).  MAINTAINED Programmed as "Output Override input"	***Dry Contact Interface:*** Virtually any control system or device can be interfaced to a ILC Apprentice controller through the use of a simple dry contact interface utilizing any of the available switch types. Please consult factory for any special requirements.	***Force Timer:*** A switch input can be mapped to force a ILC Apprentice Timer activation.  MAINTAINED	***HID Bi-Level:*** Operation of Bi-level HID Ballasts. First contact between COM and ON will turn ON power and High/Low relay. (High/Low relay is locked ON for 15 minutes for warm up period) Additional activations of ON terminal will toggle High/Low relay. Contact between OFF and COM will turn relays OFF.  MOMENTARY	

NOTE: Switch Enable-Disable: Inputs may be enabled or disabled based on Time of day

Table 1.2 – ILC Apprentice Switch Input Types

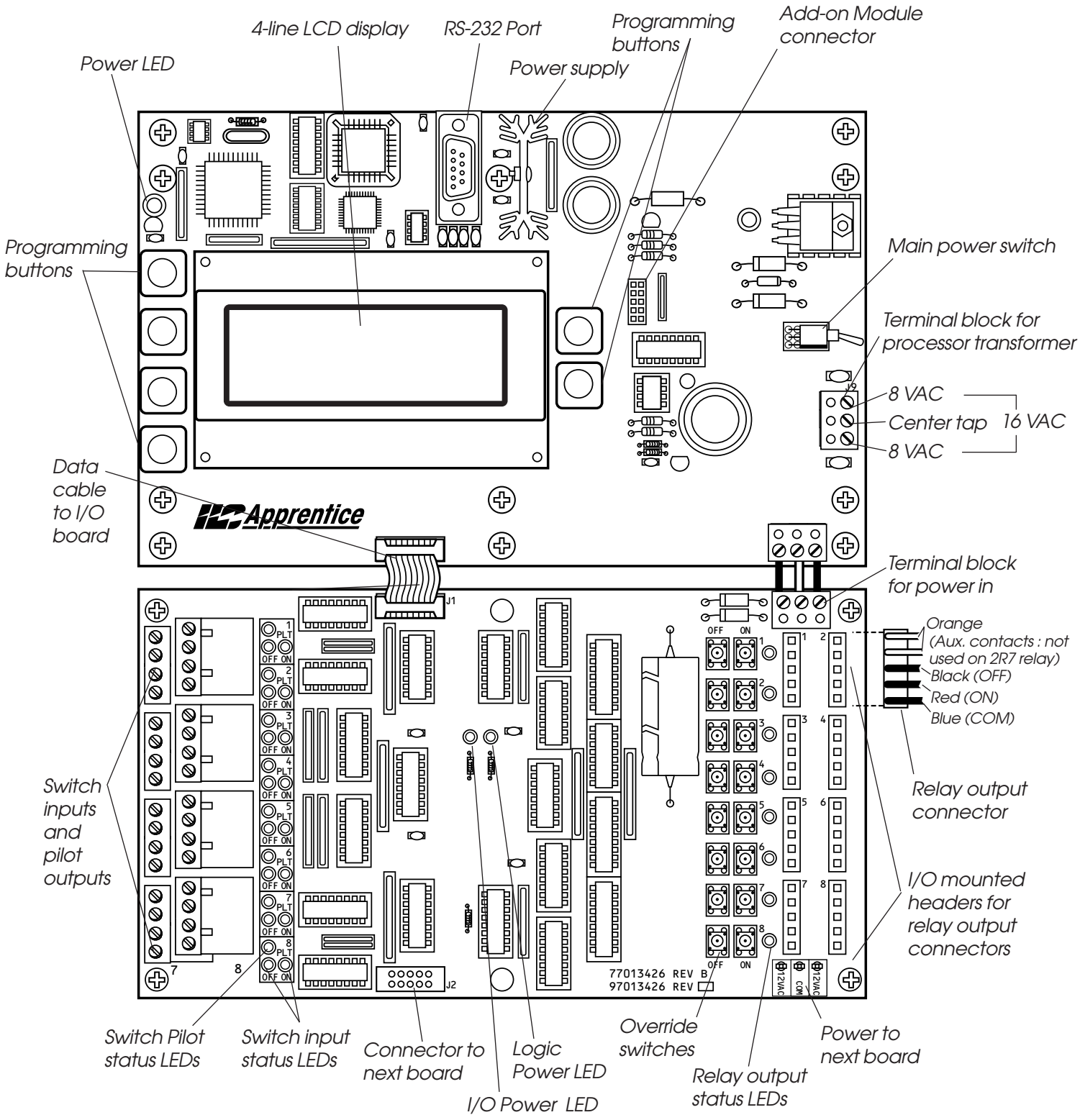


Figure 1.2 – CPU Board and I/O

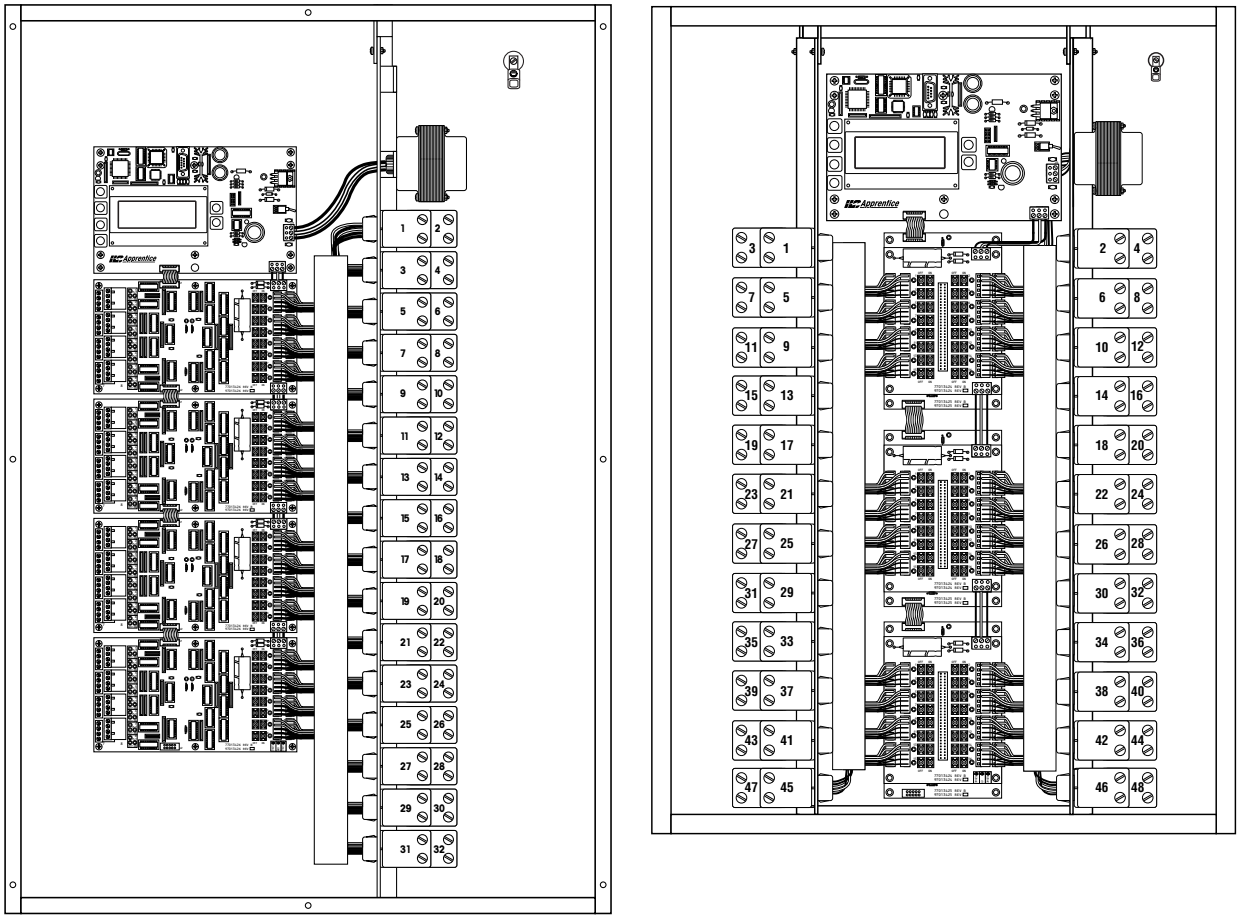


Figure 1.3 – ILC Apprentice 32 and ILC Apprentice 48 Double-sided Controller

1.1.5 Programming Buttons/Display - (See Figure 1.4.) The ILC Apprentice provides you with programming buttons and a LCD display to enable programming and view controller data.

1.1.6 Lighting Relays - control the line voltage loads. The lighting relays can control 120, 277 or 347 VAC loads rated up to 20 amps. The Class 2 low voltage control part of each relay is terminated to a relay output on the controller I/O board(s). (See Figure 1.2.) Each relay output controls only one lighting relay.

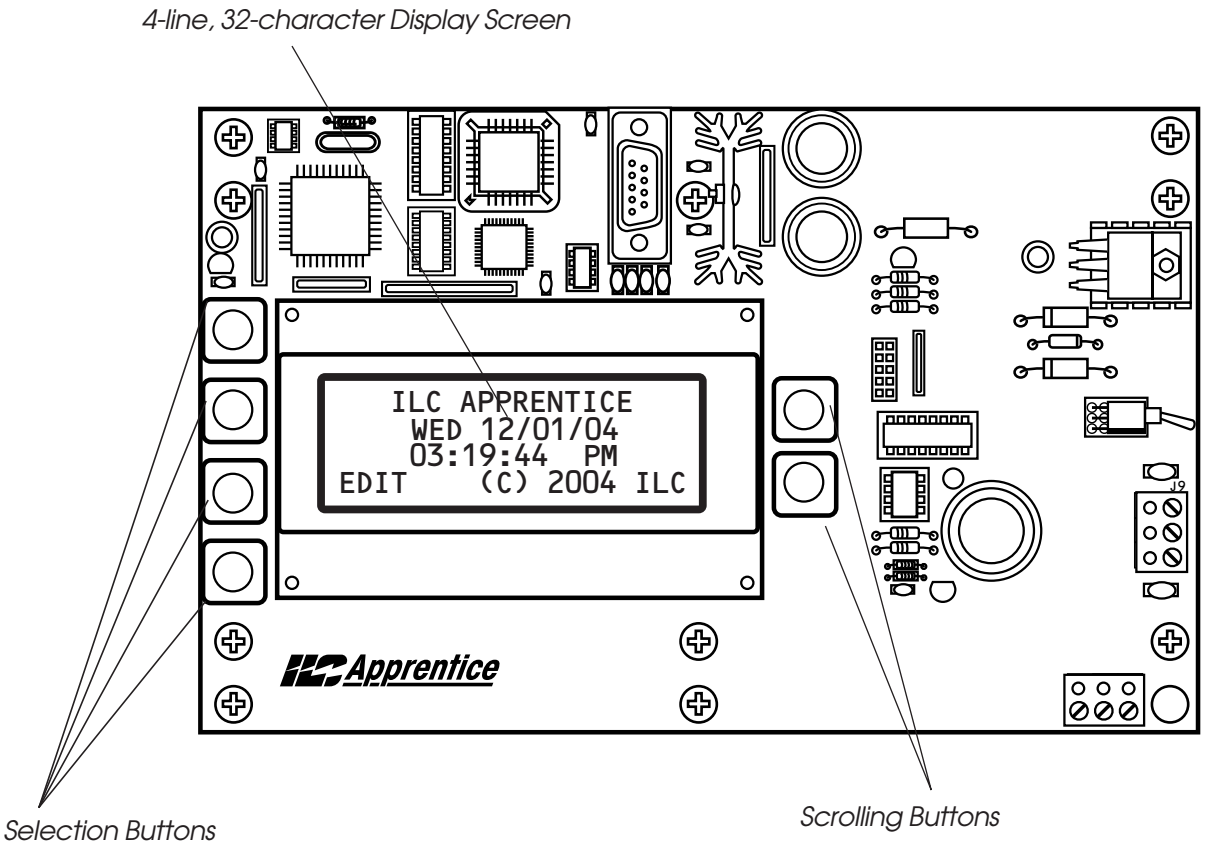


Figure 1.4 – ILC Apprentice Programming Buttons and Display

1.2 I/O Options

The ILC Apprentice controller can be equipped with the following add-on devices:

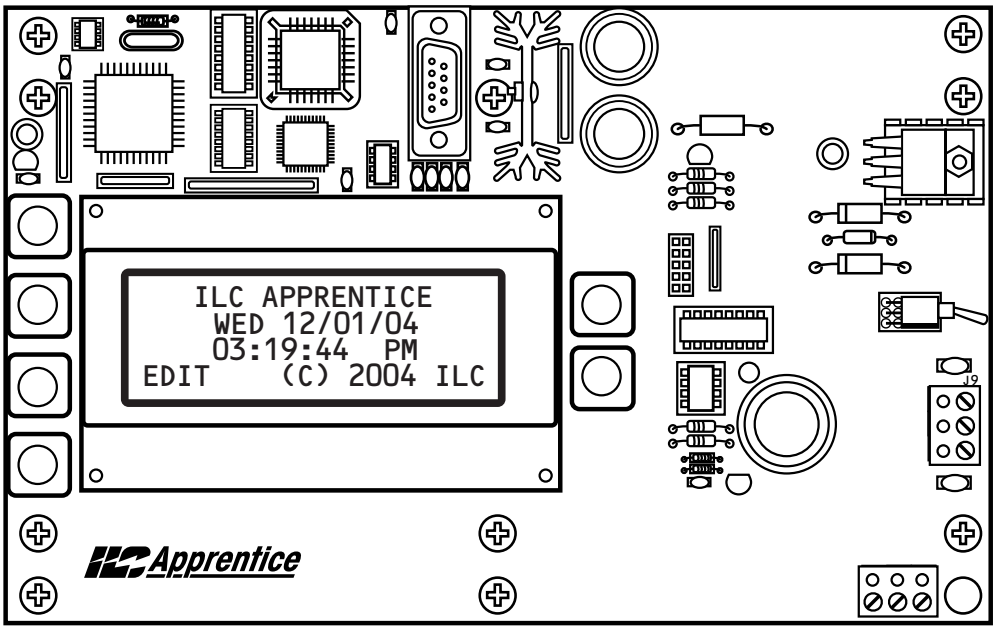
1.2.1 Voice/DTMF Add-On Module – You can equip the controller with a DTMF (Dual Tone Multi Frequency) interface, which allows you to activate switch inputs via commands from a touchtone telephone. (See Appendix A.)

1.2.2 DMX 512 Module – Provides for direct control of ON/OFF lighting or other loads from any DMX 512 control device. Any of the available 512 DMX control channels may be mapped to control individual relays. (See Appendix B.)

1.2.3 N2 Module – Provides for direct control of control devices in building automation systems using N2 protocol . (See Appendix N.)

1.2.4 MODBUS Module – Provides for direct control of control devices in building automation systems using MODBUS protocol . (See Appendix M.)

Section 2
Installation



Section 2 Installation

Objectives

This section shows you how to install the ILC Apprentice controller and how to perform required power-up verification checks.

Overview

This section covers the following topics:

- Pre-installation checks
- Mounting the controller
- Wiring the controller
- Pre-power-up checks
- Power-up and checkout
- Troubleshooting

2.1 Pre-Installation Checks

Do the following before beginning the installation:

1. Verify that you have received the proper equipment. Check the packing slip against the materials you ordered and verify that the material is appropriate for the project. Check to ensure that the voltages of the controller(s) transformers match the available power. Report any discrepancies or visible damage at once.
2. Review electrical prints and other relevant project documentation.
3. Ensure that you have a digital multi-meter.

2.2 Mounting the Controller

Consider the following when selecting a site for the ILC Apprentice.

2.2.1 Location – Typically, the ILC Apprentice controller is mounted near the lighting panel containing the circuits to be controlled by the lighting relays. The enclosure is manufactured with pre-drilled mounting holes located near the four corners of the rear wall of the enclosure. Secure the enclosure to the mounting surface with hardware appropriate for the application.

2.2.2 Environmental Considerations – The ILC Apprentice is designed to operate in temperatures between 0 and 50 degrees C (32°-112°F) and10%-90% humidity non-condensing.

CAUTION

THE ILC APPRENTICE CONTROLLER IS HOUSED IN A NEMA 1 ENCLOSURE. DO NOT INSTALL IN SITUATIONS REQUIRING SPECIAL PURPOSE ENCLOSURES OR IN AREAS WHERE THE CONTROLLER WILL BE SUBJECT TO CONDITIONS OUTSIDE ITS DESIGNED OPERATING RANGES.

2.2.3 Distance From Control Devices
Switches, pilots and other control devices can be located up to 1500 feet from the ILC Apprentice controller using 18 gauge wire.

2.3 Wiring the Controller

Perform the following procedures to wire the line and control circuits of the ILC Apprentice. Do ***NOT*** apply power to any circuits until instructed to do so. Document all terminations.

2.3.1 Wire the Control Transformer
Run a dedicated 120 or 277 VAC circuit, including grounding conductor, and terminate it to the primaries of the ILC Apprentice processor transformer. Cap all unused leads. (See Figure 2.1.)

2.3.2 Connect Line and Load – Connect line and load wires of the line voltage circuits to the Lighting Relays. (See Figure 2.1.)

2.3.3 Wire Switch Inputs - Wire the Class 2 Switch Circuits. (See Figure 2.2.)
NOTE: Keep all Class 2 wiring separated from the high voltage wiring.

1. Run the required wiring between the controller and the field-installed switches. Consult project documentation to determine the type and quantity of required switch circuits. Check each switch run to ensure that there are no shorts between conductors or to ground. Also verify that there are no opens.
2. Make the connections at the switch end.
3. Make the connections to the controller switch input terminals.

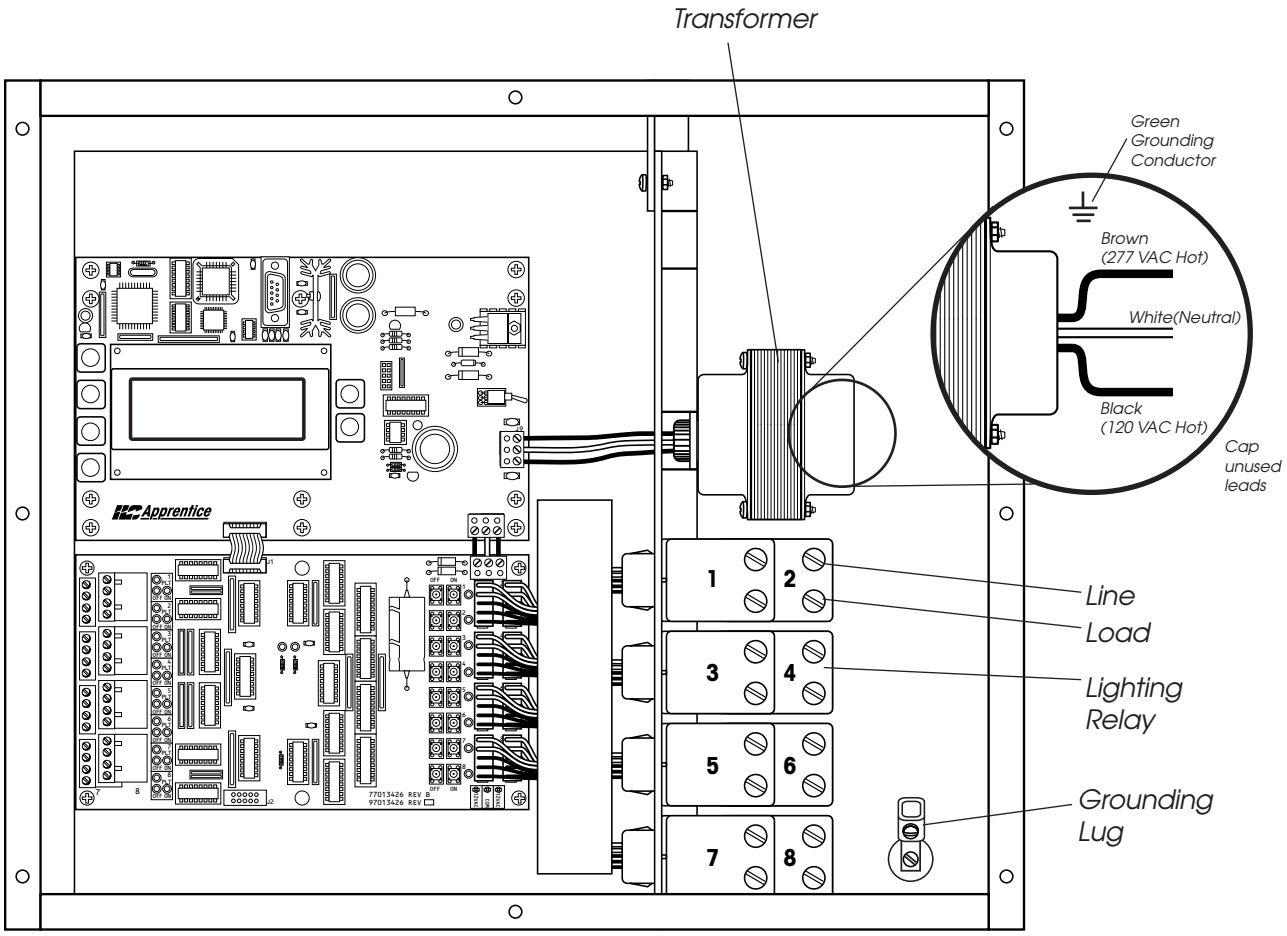


Figure 2.1 – Terminate Line to Control Transformer Primary

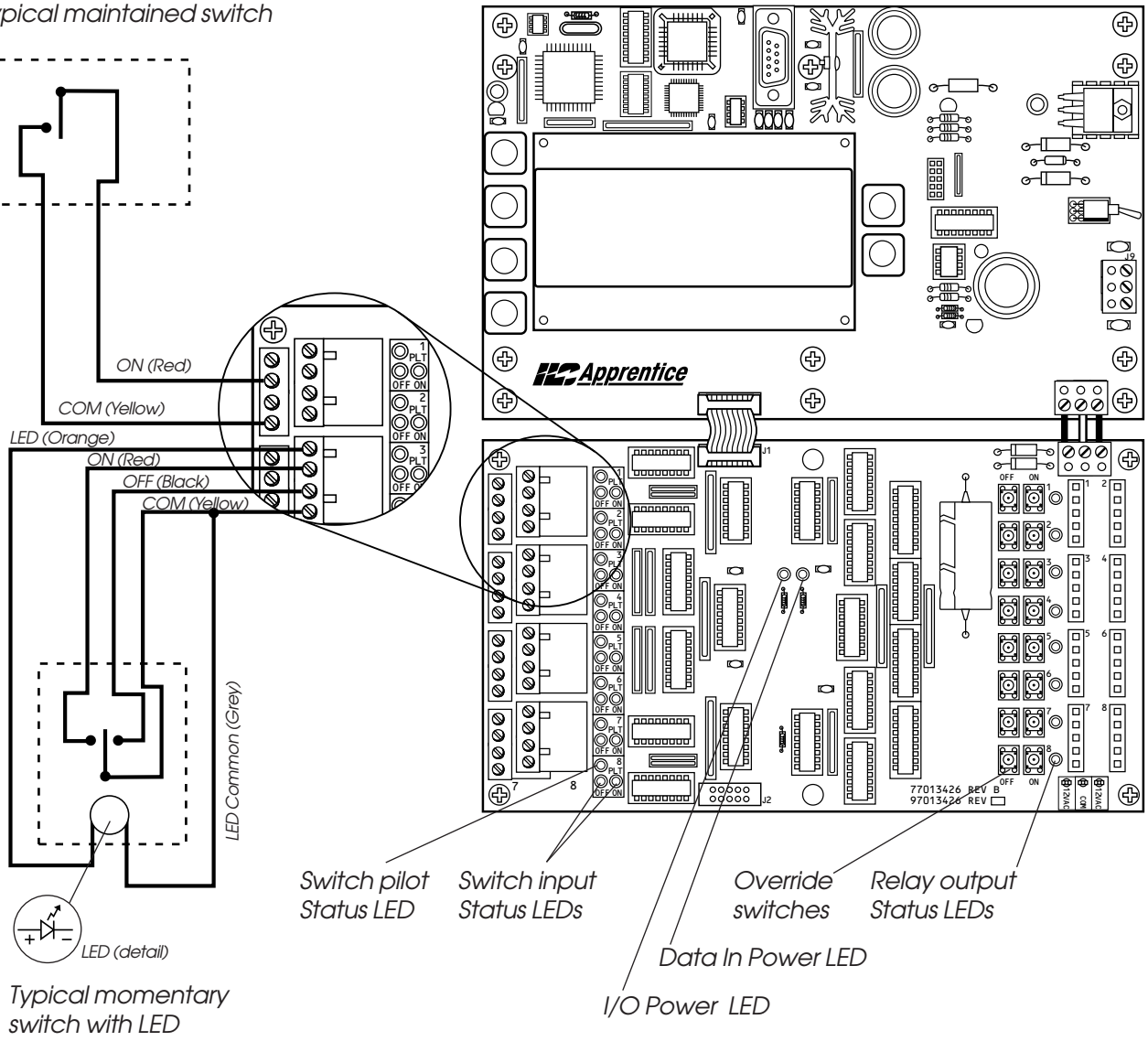


Figure 2.2 – Wire Class 2 Switch Circuits

2.4 Pre-Power Checks

Complete the following checks BEFORE applying power to the ILC Apprentice controller.

2.4.1 Check Controller Power Input

1. Verify that the controller power switch is OFF.
2. After verifying that the processor transformer source voltage is 120 or 277 VAC (whichever is appropriate), power-up the circuit.
3. Verify correct line voltage on the primary of the transformer.

2.4.2 Verify Controller's Supply Voltage

Verify that there is 16 VAC on processor transformer secondary and 8 VAC between each leg and the center tap. (See Figure 1.2.)

2.4.3 Double-Check Connections

1. Verify integrity of I/O connections.
2. Verify integrity of all internal and external wire/cabling.

2.4.4 External Monitoring and Control

If control of the ILC Apprentice via LightMaster Pro software and a PC is desired, consult the appendix for instructions regarding the RS 232 port.

2.5 Power-Up and Check Out

Complete the following procedures to power-up and checkout the ILC Apprentice controller.

2.5.1 Power-Up the Controller

1. Turn the power switch located on the CPU board ON. (See Figure 1.2.)
2. Verify that the controller keypad screen displays the default time and date.
3. Verify that both power lights on each I/O board are lit. (See Figure 2.2.)

2.5.2 Verify the Lighting Relays

Switch each relay ON and OFF, pushing the override switches located on the I/O board(s). There are separate ON and OFF switches for each lighting relay. (See Figure 2.2.) Verify that the relay status LED goes ON and OFF and that the relay itself changes state. Verify that the relay controls the proper circuit.

2.5.3 Perform Initial Programming Procedures

(See Section 3.)

1. Clear memory.
2. Set the correct date and time on the controller.
3. Program the switch inputs and timers.

2.5.4 Verify the Switching Function

1. Operate each switch.
2. Verify that each switch controls the correct lighting relays in the manner you have programmed.

2.5.5 Verify the Timer Functions

Using Demo Clock x10 feature (see Section 3),

1. Verify that the relays respond as programmed.
2. Reset the controller clock to the correct date and time.

2.6 Troubleshooting

In the event of trouble, use the following procedures to identify the problem.

2.6.1 Controller Will Not Power-Up

1. Verify that there is 120/277 VAC on the primary and 16 VAC on the secondary of the control transformer.
2. Verify that all the power LEDs on the CPU and I/O board(s) are lit.
3. If there is proper primary and secondary voltage on the transformer but the power LED is not lit and the keypad screen doesn't come up, consult the factory.

2.6.2 Lighting Relay(s) Will Not Function

1. Verify that there is 24 VDC to the terminal block on the I/O board from the CPU board.
2. Make sure that lighting control wiring is landed properly on the relay output of the I/O board(s). (Blue is common, red is ON, black is OFF, orange is status.) (See Figure 1.1.)
3. Override the affected relay ON/OFF with the override switches located on the I/O board. (See Figure 1.2.)
4. If the relay doesn't respond, consult the factory.

2.6.3 Switch Input Will Not Function

1. Check your programming.
2. Verify proper connections at field and controller end.
3. Verify that there is only one maintained switch connected per input.
4. Unhook field connections from affected input. Connect test switch of same type as field switch.
5. Work the test switch. Observe whether the switch input status LED lights when it senses a switch closure.
6. If the switch input LED lights and the relays function properly, there is probably a problem with the field wiring.
7. Verify that the CPU is seeing the switch input by *viewing the current switch status*. This can be done with the keypad by going to the *Switch Status* screen and scrolling to the individual input or scanning all of the inputs to verify that a switch closure is being seen by the controller (See Section 3-4). Also the outputs of the I/O board(s)s can be tested through the keypad. Relays can be forced individually or all swept ON or OFF using the keypad (See Section 3-3).
8. If the switch input or affected relay doesn't respond (or no response is viewed through the keypad), consult the factory.

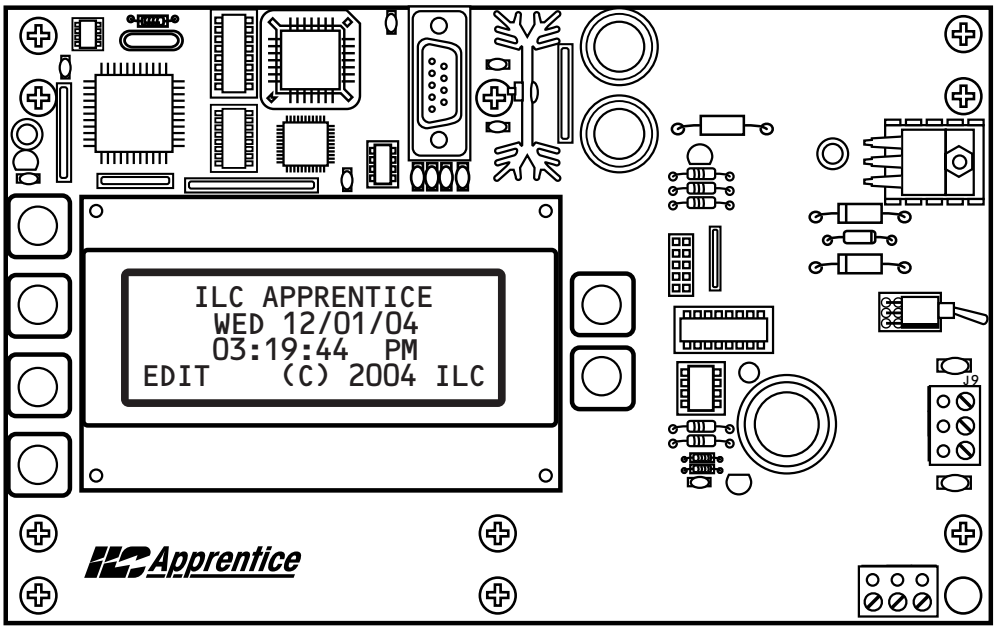
2.6.4 Timers Will Not Function Properly

1. Check your programming.
2. Verify the affected output integrity by mapping a switch input to the output and triggering it with a test switch. If the relay doesn't react, consult the factory.

2.6.5 Entire I/O Board(s) Doesn't Work

1. Check to ensure that the data and power cables linking the I/O boards are connected properly and are free of opens and shorts.
2. Check to ensure that both of the power LEDs on each I/O board are lit.
3. Verify that the CPU sees the expansion I/O boards using the keypad. This can be done by going to the Relay Status screen and scrolling through the outputs to see if the CPU sees all of the outputs (See Section 3-3).
4. If the I/O board is not recognized by the CPU, consult the factory.

Section 3
Programming



Section 3 Programming

Objectives

In this section you will learn how to program the ILC Apprentice controller.

Conventions/Definitions

Actual key strokes/entries appear as arrows: for example, ▶ followed (if applicable) by the appropriate keyword. For example, to leave the Home screen, the entry is ▶ EDIT. (See the figure below.)

The term default appears in this section. **Default** means the value or entry preprogrammed at the factory. In many cases the default may be appropriate for your application, making field programming unnecessary. For example momentary ON/OFF is the default switch type; therefore, if 3 wire momentary switches are used exclusively at your facility, you may not need to make entries defining the SWITCH OPTION.

Another term used often is **Home screen.** The Home screen is the top level screen of the controller. It features the controller name, the date and the time. (See Figure 3.1.) The controller displays this screen on power-up and at times when you are not programming or checking input/output status.

Information Presentation

The information for each programming task is presented in the following way: First, a screen flow diagram or diagrams illustrating the relevant data entry screens. (This may be all the information that is required by the experienced user.) Second, a more detailed explanation of the relevant concepts and programming procedures will be presented. Third, specific sample operations will be displayed.

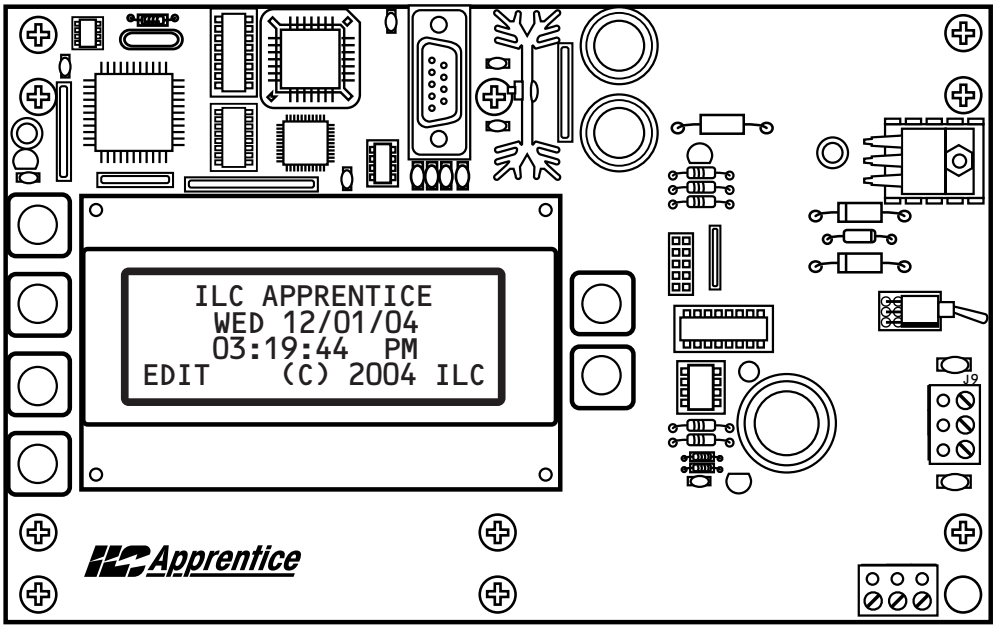


Figure 3.1 - ILC Apprentice Home Screen

Automatic Timeout/Data Saving

If you do not press any keys for 5 minutes while you are programming, the controller will automatically return to the Home screen. To ensure programming is properly saved, enter the proper keyword – usually ▶ EXIT or ▶ SAVE.

3.1 "Hidden" Menu Choices

There are three operations you can perform from the "Hidden" Menu: **CLEAR ALL MEMORY** and **DEMO CLOCK (10X). CLEAR ALL MEMORY** allows you to clear the programmed memory that has been entered and resets the parameters to their default values. **DEMO CLOCK (10X)** speeds up the controller clock to run 10 times faster than normal and can be used to test the operation of time based operations. **To reset the clock to normal operation power down the controller.** The third operation concerns changing the relay output pulse duration.

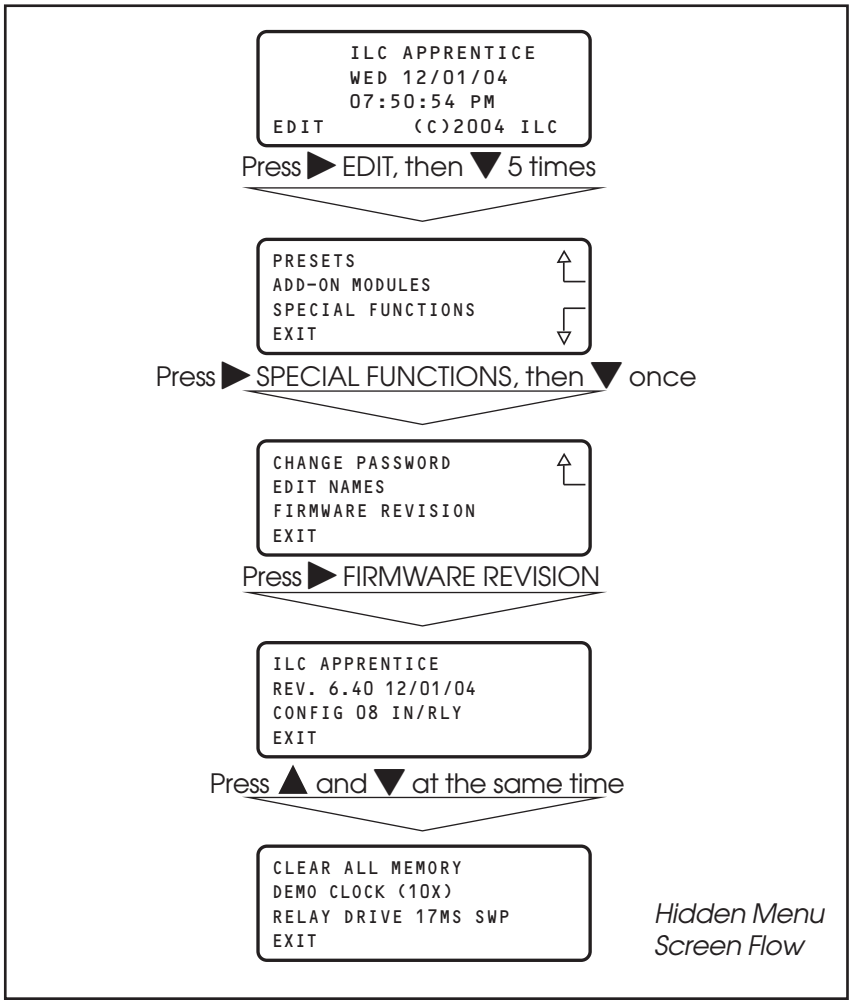
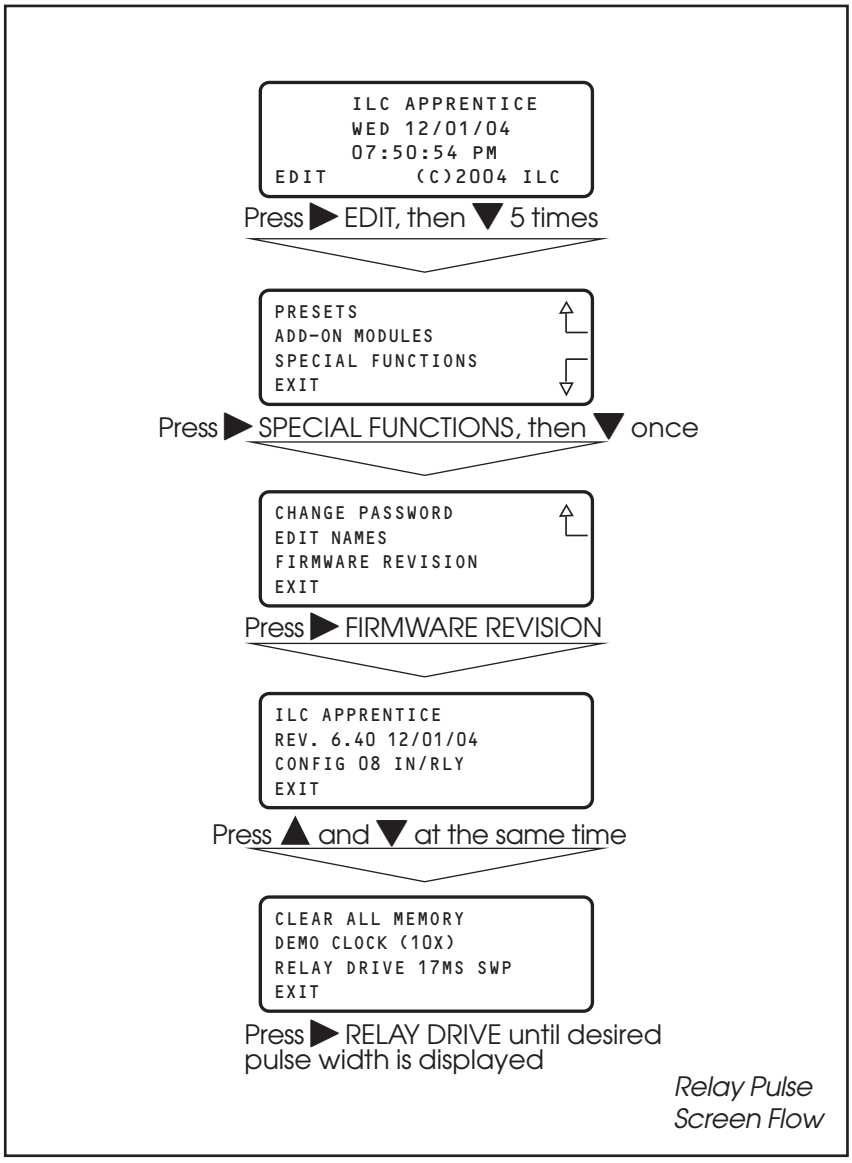


Figure 3.2

3.2 Setting Relay Pulse Width – Fast Track



Relay Pulse Screen Flow

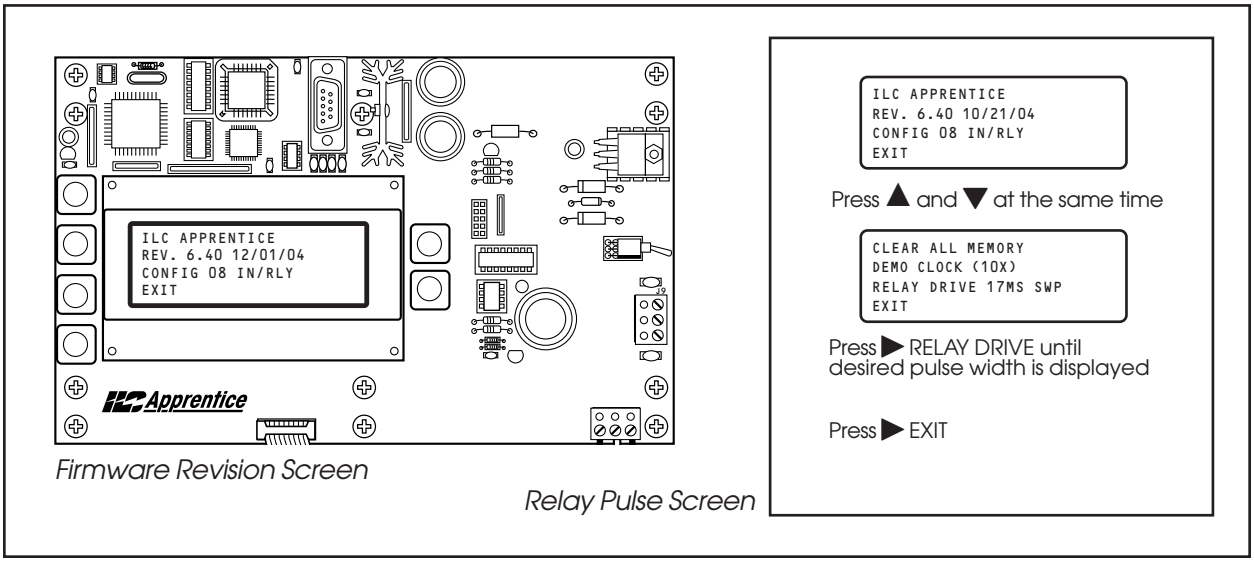
How to Change the Relay Pulse

DURATION CONCEPTS AND PARAMETERS

This function allows you to set the relay drive characteristics for the ILC Apprentice Controller. The pulse width is the time duration the relay is activated for a change of state. The options are 17ms sweep pulse (default) for each relay in succession, 50 ms sweep pulse for each relay in succession, 17ms pulse with instant ON/OFF for all the relays, and 50 ms instant ON/OFF for all the relays.

SAMPLE OPERATION:
Change the Relay Output pulse to 50ms

1. From the Firmware Revision screen, press ▲ and ▼ at the same time to access the Hidden Screen
2. Press ▶ RELAY DRIVE until the 50ms pulse width appears
3. Press ▶ EXIT to leave the Hidden Menu Screen and return to the Home Screen

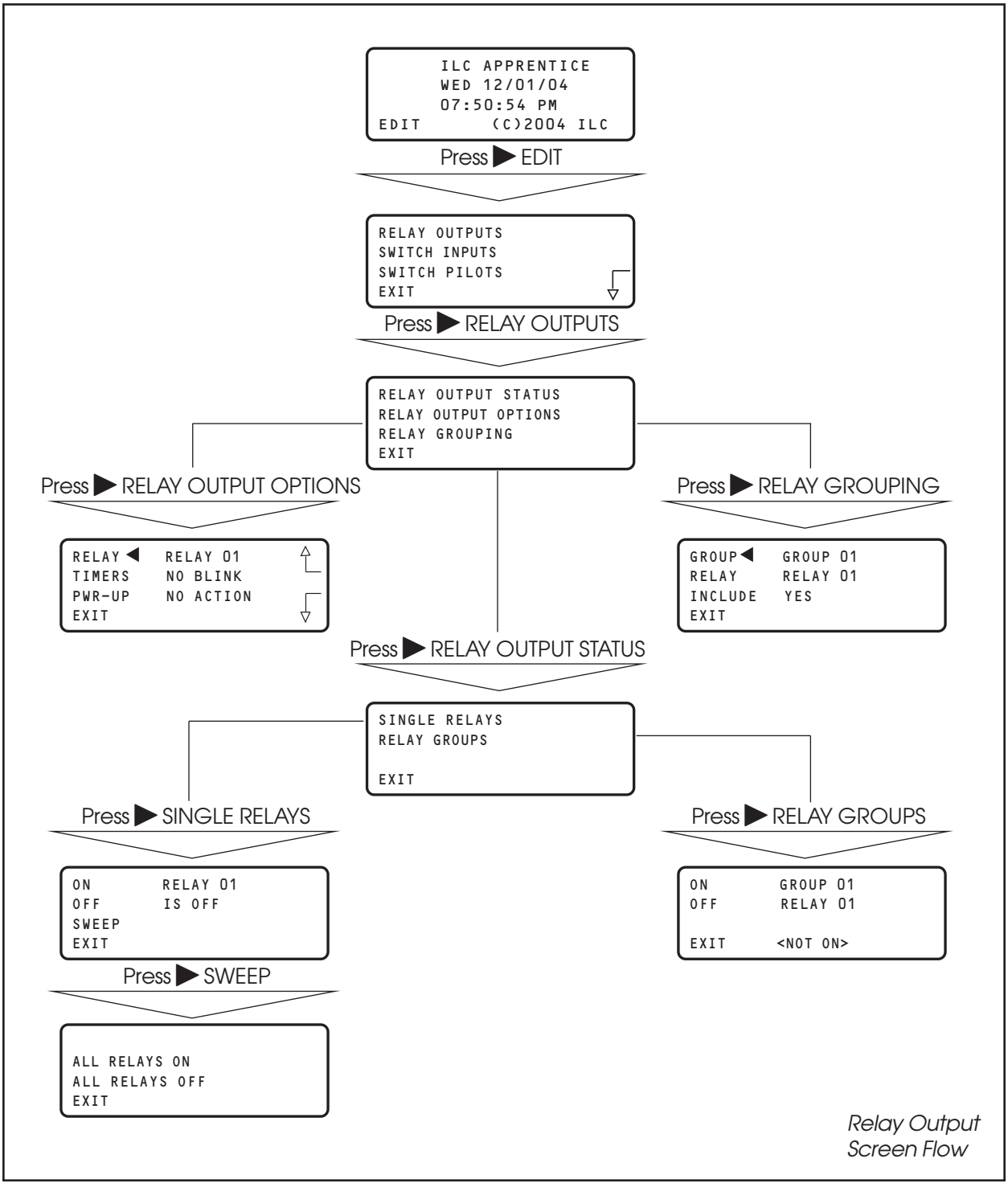


Firmware Revision Screen

Relay Pulse Screen

Figure 3.3

3.3 Relay Output Operations Overview – Fast Track



Relay Output Screen Flow

Relay Output Operations

CONCEPTS AND PARAMETERS

You can use RELAY OUTPUTS to view the current ON/OFF Status of the relay outputs. You also have the option of switching individual relays, user defined relay groups or all the controller relay outputs ON/OFF from the keypad. In addition you can define certain relay output parameters (See Tables 3.1, 3.2) and form relay groups.

Parameter Key:

RELAY: One of a possible 48 Relay Outputs

RELAY OUTPUT STATUS:

ON = Turn Relay Output or Relay Group ON
OFF = Turn Relay Output or Relay Group OFF
SWEEP = Turn all of the controller relays ON or OFF

RELAY OUTPUT OPTIONS:

TIMERS = how relay output will react to an OFF Timer. (The default is NO BLINK)
PWR-UP = how relay output will react when the controller is powered up. The default is NO ACTION
RELAY GROUP = a user defined group of relay outputs that will react as a group to a switch or timer signal.

Table 3.1

TIMERS Choice	Definition
NO BLINK (default)	The relay will not blink prior to an OFF Timer
BLINK	The relay output blinks and postpones the OFF timer for a user defined time (2-99 minutes) The default alert time is 5 minutes. If a switch controlling the relays is turned ON during this time, the OFF Timer is again postponed for a user defined period (5-999 minutes) or until the switch is turned OFF. The default override is 120 minutes.
HID DELAY	Same as BLINK (the OFF timer is postponed) except that there is NO blink warning.
ALARM ON PLS	During the ON pulse period (1-99 seconds programmable) the relay is cycled ON and OFF at 1 second intervals. The relay returns to OFF when complete. Used to alarm or buzzer signal applications
ALARM OFF PLS	During the OFF pulse period (1-99 seconds programmable) the relay is cycled OFF and ON at 1 second intervals. The relay returns to ON when complete . Used in settable blink alert applications.
ALARM ON	Relay will turn ON for a programmed duration (1-99 seconds) and then return to the OFF state. Used for mechanically latching contactor control.
ALARM OFF	Relay will turn OFF for a programmed duration (1-99 seconds) and then return to the ON state. Used with sentry switch or Watt Stopper 110.
Note: *how to change blink alert, override, and alarm pulse times defaults is done by selecting BLINK ALERT/ALARMS from the TIMER menu.*	

Table 3.2

PWR-UP Choices	Definition
NO ACTION (default)	The relay output holds its pre-existing state when power is applied or re-applied to the controller
TURN ON	The relay output switches ON when power is applied or reapplied to the controller.
TURN OFF	The relay output switches OFF when power is applied or reapplied to the controller
ON/IN:1	The relay output switches ON when power is applied or reapplied to the controller if Input 1 is closed at the time of power-up.
OFF/IN:1	The relay output switches OFF when power is applied or reapplied to the controller if Input 1 is closed at the time of power-up.

SAMPLE OPERATION:
How to Turn a Relay ON from the Keypad

1. From the Home screen, press ▶ EDIT

2. When the MAIN menu appears, press ▶ RELAY OUTPUTS.

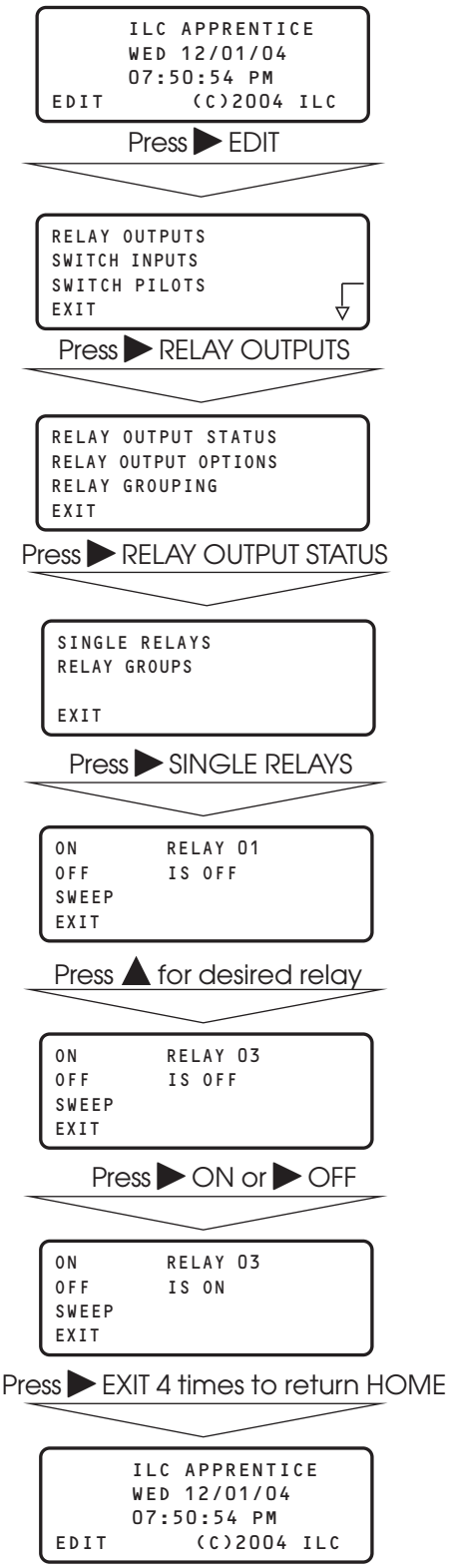
3. When the RELAY OUTPUTS menu appears, press ▶ RELAY OUTPUT STATUS.

4. When the Single Relay/Group Menu appears, press ▶ SINGLE RELAYS.

5. When the Relay Status menu appears, press ▲ or ▼ until the relay you want to control appears.

6. Press ▶ ON to switch ON the relay or ▶ OFF to switch OFF the relay.

7. Press ▶ EXIT 4 times to return to the Home Screen.



SAMPLE OPERATION:
How To Program a Relay To Perform a Blink Alert

1. From the Home screen, press ▶ EDIT.

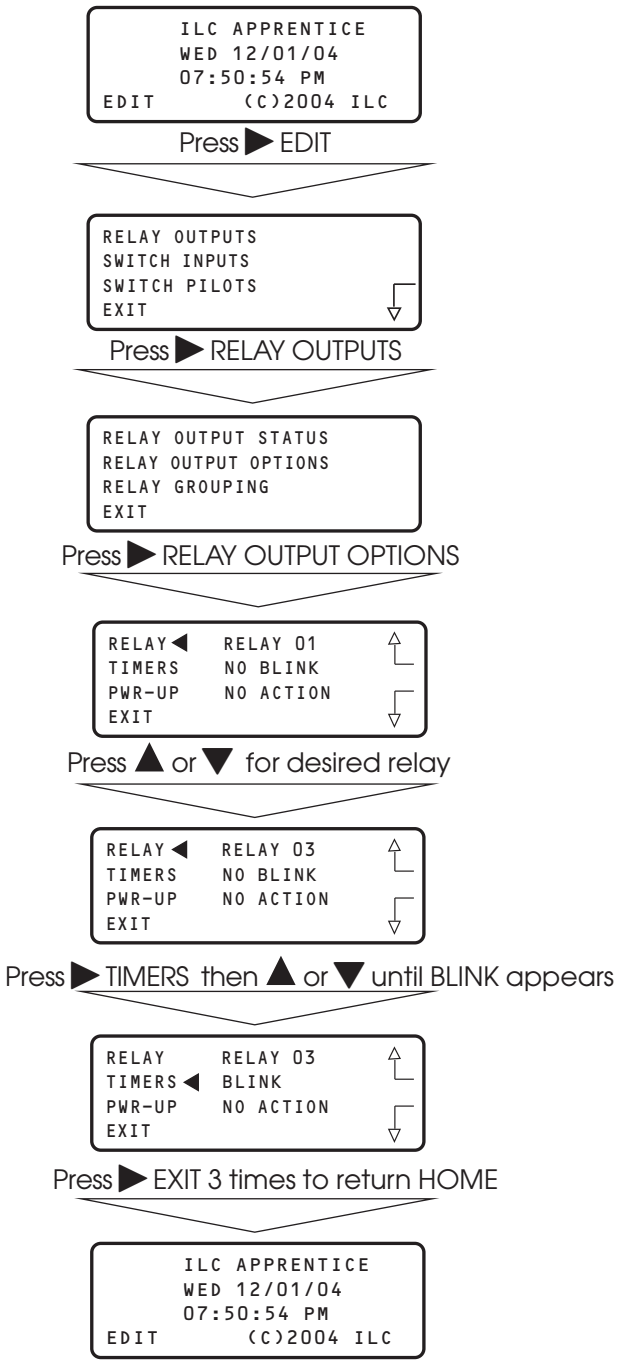
2. When the MAIN menu appears, press ▶ RELAY OUTPUTS.

3. Press ▶ RELAY OUTPUT OPTIONS.

4. When the Relay Options screen appears, press ▲ or ▼ until the Relay you want to perform the blink alert appears.

5. Press ▶ TIMERS; then ▲ or ▼ until BLINK appears in the timer field.

6. Press ▶ EXIT 3 times to return to the Home screen.



SAMPLE OPERATION:
How To Define a Relay Group

1. From the Home screen, press ▶ EDIT.

2. When the MAIN menu appears, press ▶ RELAY OUTPUTS.

3. Press ▶ RELAY GROUPING

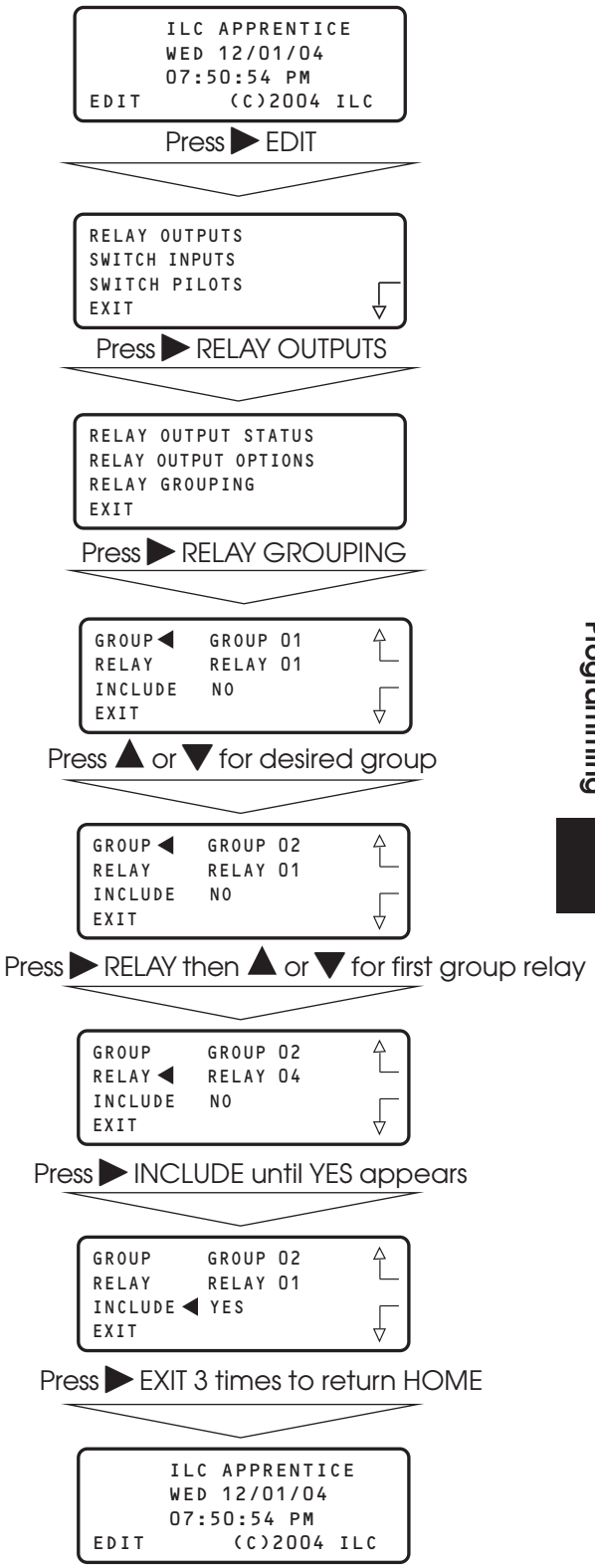
4. When the Relay Grouping screen appears, press ▲ or ▼ to select the relay group number.

5. Press ▶ RELAY then ▲ or ▼ until the first relay to be part of the group appears.

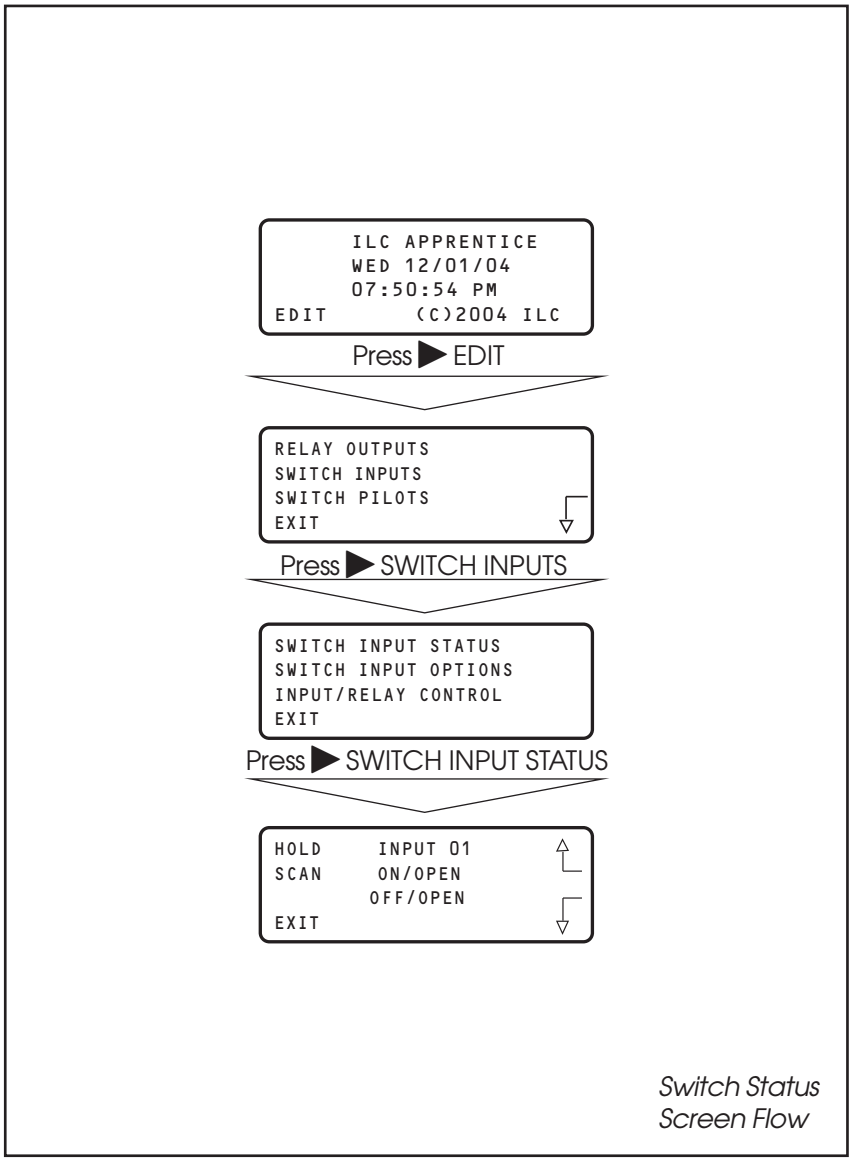
6. Press ▶ INCLUDE until YES appears in the entry field.

7. Repeat steps 5 and 6 to include additional relays.

8. Press ▶ EXIT 3 times to return to the Home screen.

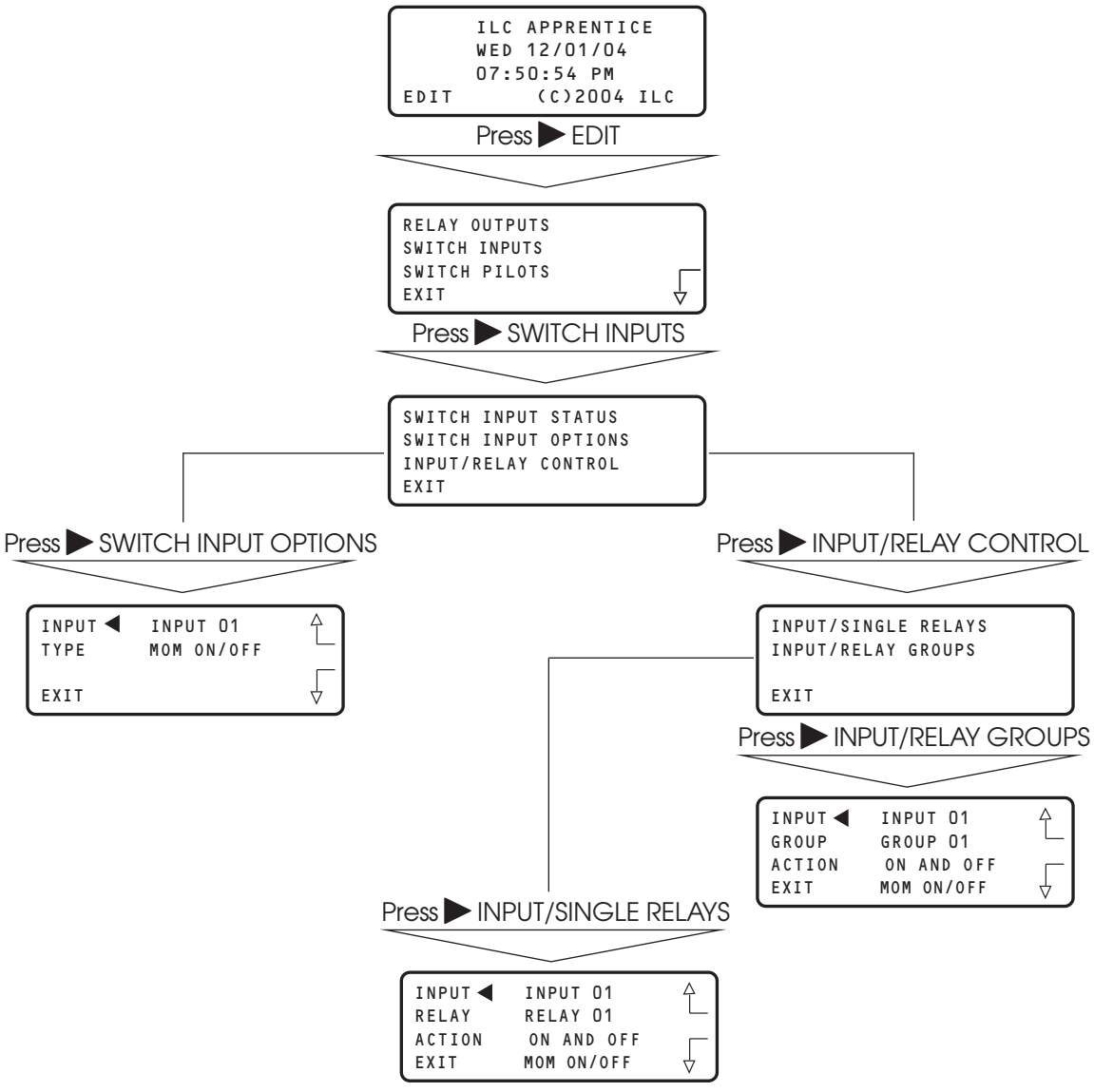


3.4 Switch Operations: Status – Fast Track



Switch Status Screen Flow

Switch Operations: Controlling Relays with a Switch – Fast Track



Switch Control Screen Flow

Switch Status

CONCEPTS AND PARAMETERS

This function allows you to view the current status of each switch input attached to the the ILC Apprentice controller.

Parameter Key:

INPUT = One of a possible 48 switch inputs

HOLD ▼ or ▲ = access the input you want to view.

SCAN = scans all output for an ON or OFF closure and displays most recent input that has changed

OPEN = maintained switch is OPEN; momentary switch is in neutral position.

CLOSED = maintained switch is closed; momentary switch is currently closing

SAMPLE OPERATION:
Check the current status of a Switch Input

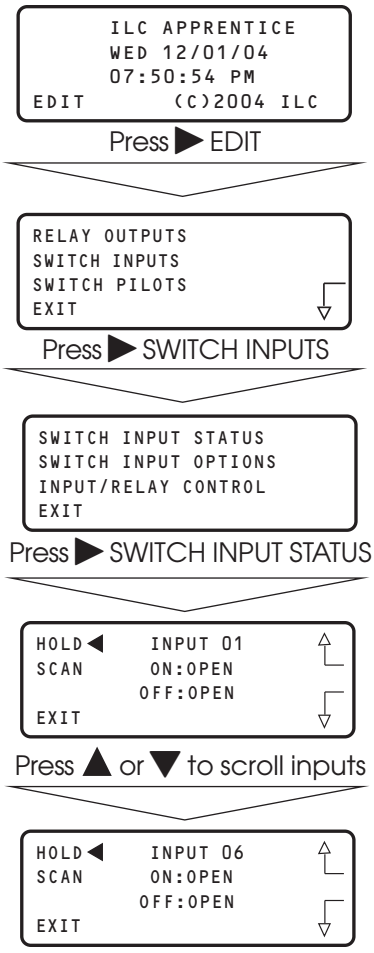
1. From the Home screen. Press ▶ EDIT.

2. From the Main Menu, Press ▶ SWITCH INPUTS.

3. From the Switch Input Menu, press ▶ SWITCH INPUT STATUS.

4. When the Switch Input Status screen appears, press ▲ or ▼ until the switch you want to check appears.

5. Press ▶ EXIT four times to return to the Home screen



How To Control A Relay or Relay Group of Relays With a Switch

CONCEPTS AND PARAMETERS

To control a relay with a switch you must:

1. Define the selected switch input
2. Select the relay output or relay group that the switch controls
3. Define how the switch will control the relay.

NOTE: The ILC Apprentice controller input can accept dry contact inputs from 3 wire SPDT momentary contact switches or 2 wire momentary and maintained contact switches. (See Figure 3.2)

Parameter Key:

SWITCH INPUT OPTIONS:

INPUT = 1 of 48 possible controller switch inputs

TYPE = switch type (Default is MOM. ON/OFF; see Table 3.3 for a list of possible switch types.)

RELAY = 1 of 48 possible controller relay outputs

RELAY GROUP = a user defined group of relay outputs that will react as a group to a switch or timer signal.

ACTION = How the switch actuation will effect the relay. (Default is NO ACTION). Other possible responses ON ONLY, OFF ONLY, ON AND OFF, BLINK ALERT

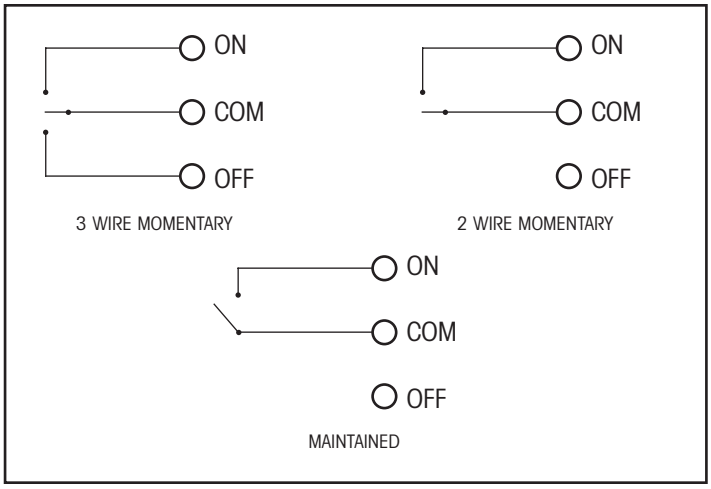


Figure 3.2

Type	Physical	Operation
Momentary ON/OFF (default type)	3-wire momentary	Momentary contact between ON and Common turns controlled relay outputs ON. Momentary contact between OFF and Common turns controlled relay outputs OFF.
Momentary Pushbutton	2-wire momentary	Momentary contact between ON and Common turns controlled relays ON and OFF alternately each time contact is made.
Maintained ON/OFF	2-wire maintained	When contact between ON and Common are made, controlled relays turn ON. When contact is broken, controlled relays turn OFF.
Maintained Multi-way	2-wire maintained	When contact is made or broken between ON and Common, the controlled relays will toggle from ON to OFF or OFF to ON; similar to conventional 3-way switching.
Set Preset	2-wire Momentary	When momentary contact between ON and Common is made, the controlled relay outputs will go to their programmed states.
Timed ON	2 or 3 wire momentary	Contact between ON and Common will turn relay outputs on for a programmed time. At the end of this time the controlled relays will turn OFF. Contact between OFF and Common will turn relays OFF.
HID BI-LEVEL	3 wire momentary	The first contact between ON and Common, turns the ON/OFF ballast relay ON and the HIGH/LOW ballast relay HIGH (NC default) or Low (NO default) and locks them in this position for a 15 minute warm up period. Subsequent contact closures between ON and Common toggle between HIGH and LOW. Contact between OFF and COMMON locks both the ON/OFF and HIGH/LOW ballast relays OFF for 15 minutes.
Two-Step Group	2-wire momentary	Upon switch activation, Group A relays turn ON and Group B turn OFF. The following activation causes Group A to turn OFF and Group B to turn ON. The pattern repeats with each switch activation.
Four-Step Group	2-wire momentary	On the first activation, Group A relays turn ON and Group B turn OFF. On the second activation, Group A turns OFF and B turns ON. The third activation causes both A and B to go ON. On the fourth activation, both A and B go OFF. Then the pattern repeats.
Input Disable	2-wire maintained	As long as the switch is closed, other selected inputs are disabled.
Timer Disable	2-wire maintained	As long as the switch is closed, selected timers are disabled.
Output Override	2-wire maintained	When the switch is closed, selected relay(s) will go to the programmed ON, OFF, or No Control status, other signals are ignored until switch is open.
FORCE TIMER	2 wire maintained	The switch closure will trigger the selected timer.

Table 3.3 – ILC Apprentice Switch Types

SAMPLE OPERATION:
Control a single Relay Output with a Switch

Define the Switch Input:

1. From the Home screen, press ▶ EDIT.

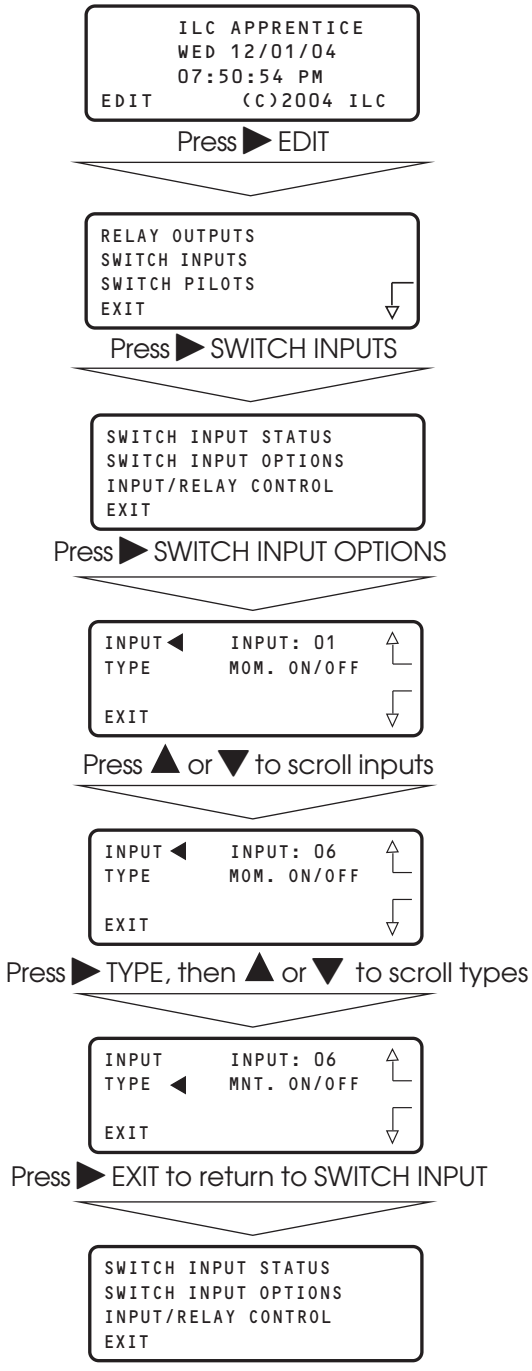
2. When the MAIN menu appears, press ▶ SWITCH INPUTS.

3. From the Switch Input Menu, press ▶ SWITCH INPUT OPTIONS.

4. When the Switch Input options screen appears, press ▲ or ▼ until the switch input you want to define appears.

5. Press ▶ TYPE; then ▲ or ▼ until the desired switch type appears.

6. Press ▶ EXIT to return to the Switch Input menu.



SAMPLE OPERATION:
Control a single Relay Output with a Switch

Select the relay to be controlled:

1. From the Switch Input Menu, press ▶ INPUT/RELAY CONTROL.

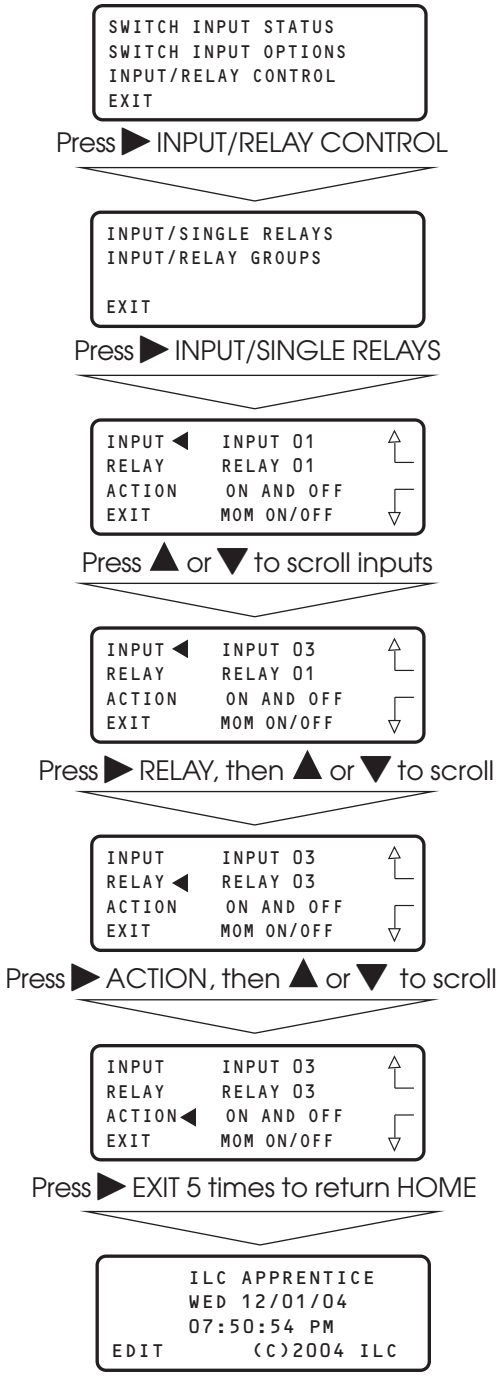
2. When the Single Relay/Relay Group Control menu appears, press ▶ INPUT/ SINGLE RELAYS.

3. When the Input/Relay Control Screen appears press ▲ or ▼ until the input you are programming appears in the INPUT field.

4. Press ▶ RELAY; then press ▲ or ▼ until the relay to be controlled appears in the RELAY field.

5. Press ▶ ACTION; then ▲ or ▼ until the desired switch action appears.

6. Press ▶ EXIT 5 times to return to the Home screen.



SAMPLE OPERATION:
Control a Relay Group with a Switch

Define the Switch Input:

1. From the Home screen, press ▶ EDIT.

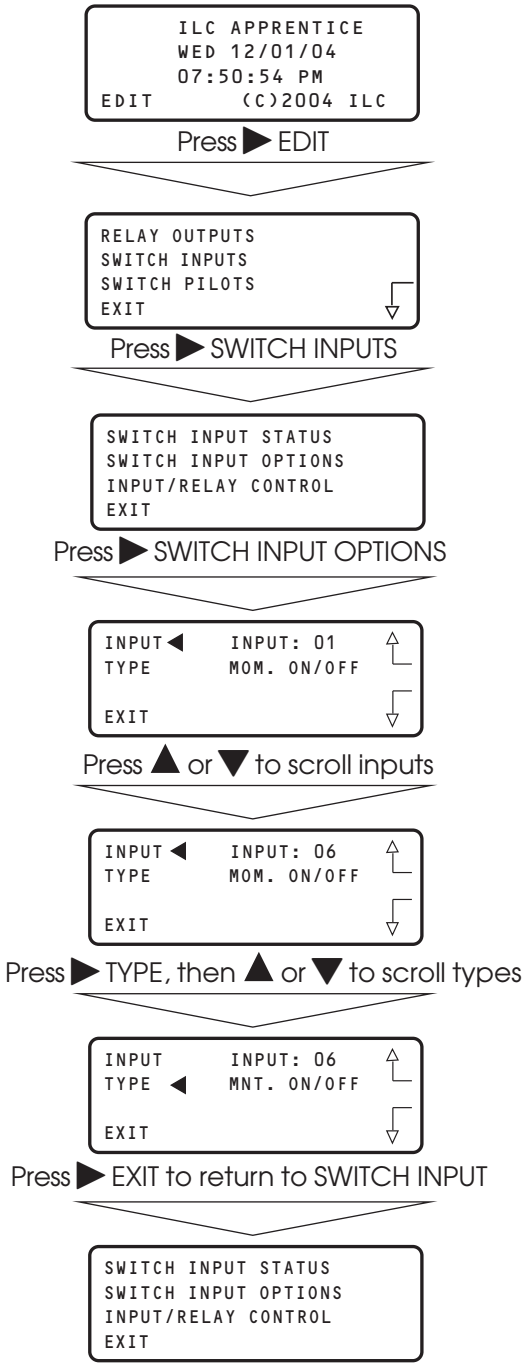
2. When the MAIN menu appears, press ▶ SWITCH INPUTS.

3. From the Switch Input Menu, press ▶ SWITCH INPUT OPTIONS.

4. When the Switch Input options screen appears, press ▲ or ▼ until the switch input you want to define appears.

5. Press ▶ TYPE; then ▲ or ▼ until the desired switch type appears.

6. Press ▶ EXIT to return to the Switch Input menu.



SAMPLE OPERATION:
Control a Relay Group with a Switch

Select the relay group that you want the switch to control. Note : Be sure the relay group you wish to control has been previously defined. (See Sample Operation – How to Define a Relay Group.)

1. From the Switch Input Menu, press ▶ INPUT/RELAY CONTROL.

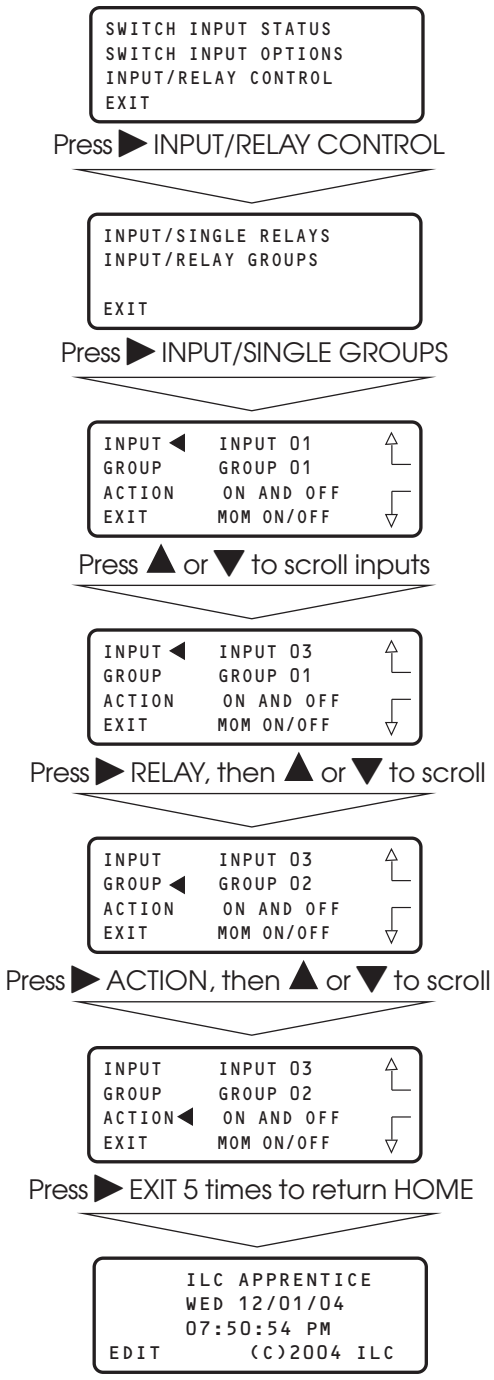
2. When the Single Relay/Relay Group Control menu appears, press ▶ INPUT/RELAY GROUPS.

3. When the Input/Relay Group Control Screen appears press ▲ or ▼ until the input you are programming appears in the INPUT field.

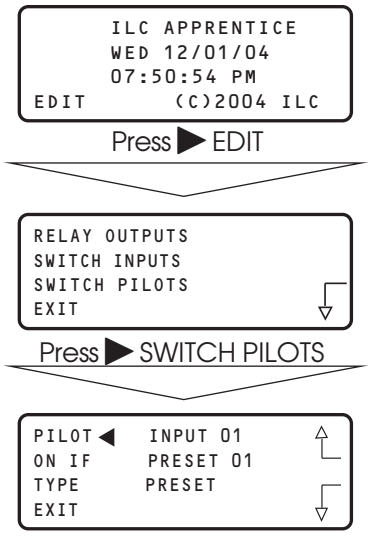
4. Press ▶ GROUP; then press ▲ or ▼ until the relay to be controlled appears in the GROUP field.

5. Press ▶ ACTION; then ▲ or ▼ until the desired switch action appears.

6. Press ▶ EXIT 5 times to return to the Home screen.



3.5 Switch Pilot Operation: – Fast Track



Switch Pilot Screen Flow

How to Define a Switch Pilot

CONCEPTS AND PARAMETERS

To Define a Switch Pilot you must:

1. Select the input whose Input Pilot status LED is to light.
2. Select the relay output, relay group or preset that is to light the selected status LED.

NOTE: Switch Pilots refer to switch pilot lights located on the controller's I/O board(s)

Parameter Key:

PILOT= The number of the switch input pilot (1-48)

ON IF= The number of the relay, relay group, or preset which will actuate the switch pilot (1-48)

TYPE= the type of actuator: relay output, group, or preset

Note: The default is for the switch pilot to light with the corresponding relay status output LED lights

SAMPLE OPERATION:
Program a Status LED to Light when a Preset is ON

1. From the Home screen, press ▶ EDIT.

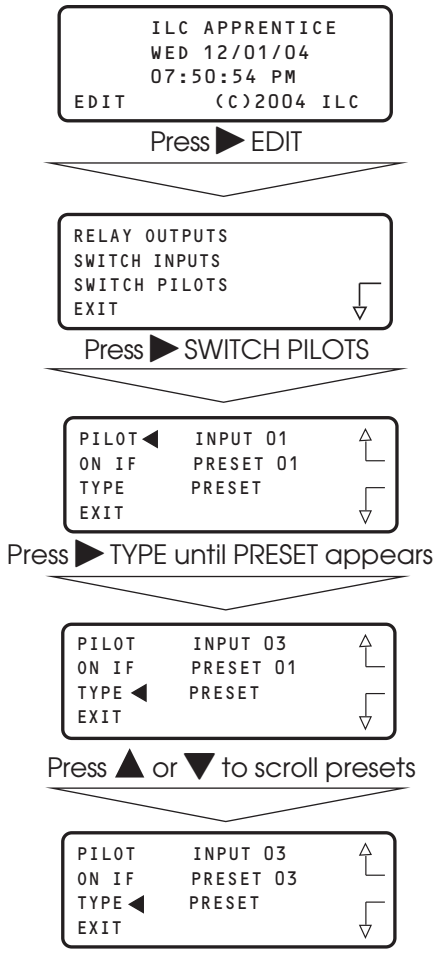
2. When the MAIN menu appears, press ▶ SWITCH PILOTS.

3. From the Status Definition Screen, press ▲ or ▼ to select the Input.

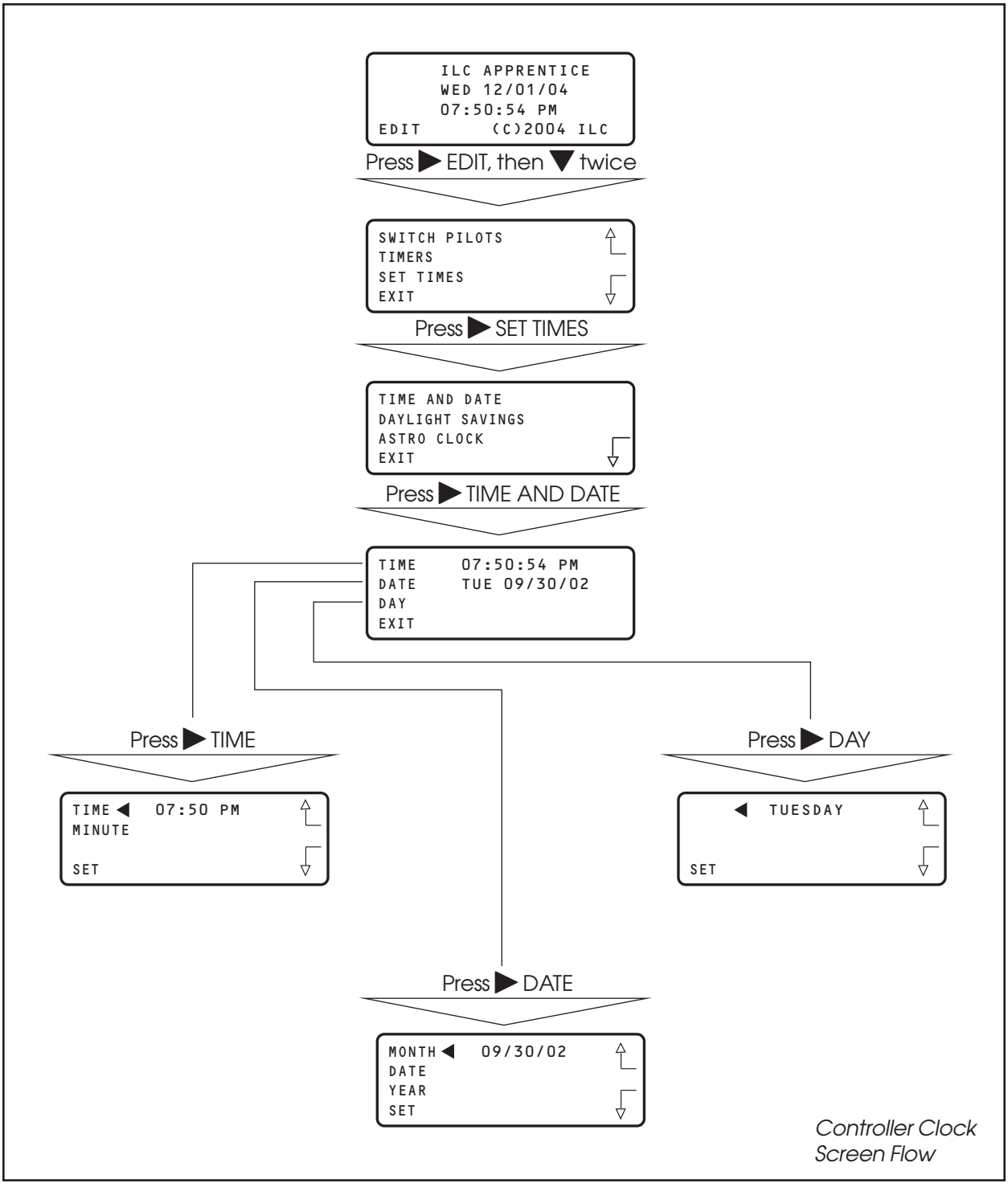
4. Press ▶ TYPE until PRESET appears.

5. Press ▲ or ▼ until the desired preset appears.

6. Press ▶ EXIT three times to return to the Home Screen.



3.6 How to Set the Controller Clock – Fast Track

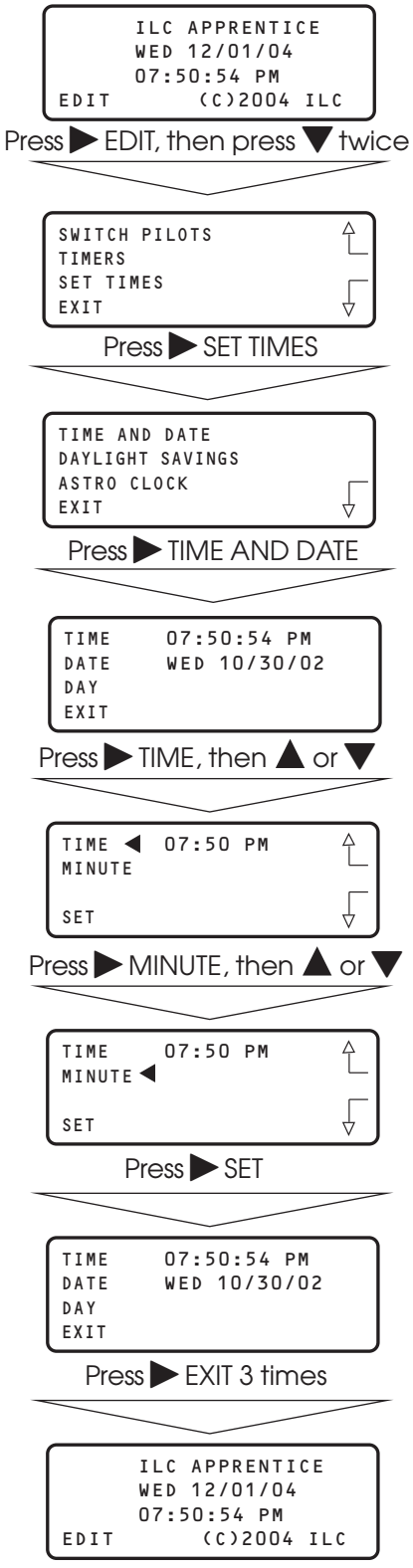


Controller Clock Screen Flow

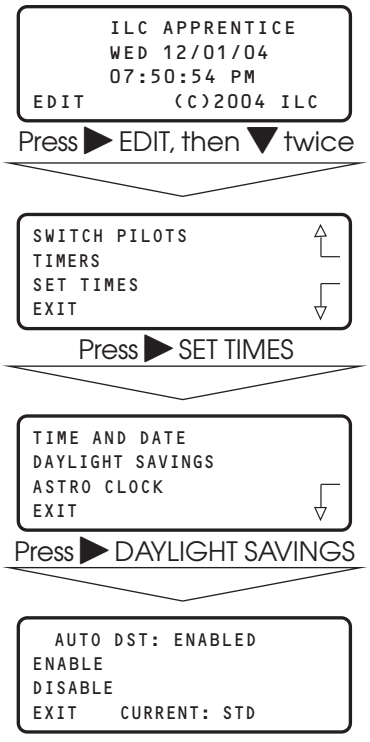
How to Set the Controller Clock

Setting the controller clock to the proper time and date is fundamental to the execution of all time based operations.

1. From the Home screen, press ▶ EDIT, then press ▼ twice.
2. From the main menu, press ▶ SET TIMES.
3. From the Set Times menu, press ▶ TIME and DATE.
4. From the Time/Date menu, press ▶ TIME.
5. When the Time Setting screen appears, press ▲ or ▼ until the proper hour is displayed. Be sure that AM/PM setting is correct.
6. Press ▶ MINUTE; then press ▲ or ▼ until the correct minute is displayed.
7. Press ▶ SET to return to the Time/Date menu.
8. Press ▶ DATE.
9. MONTH is displayed; then press ▲ or ▼ until the correct month is displayed.
10. Press ▶ DATE; then press ▲ or ▼ until the correct day of the month is displayed.
11. Press ▶ YEAR; then press ▲ or ▼ until the correct year is displayed.
12. Press ▶ SET to return to the Time/Date menu.
13. Press ▶ DAY; then press ▲ or ▼ until the correct day of the week is displayed.
14. Press ▶ SET to return to the Time/Date menu.
15. Press ▶ EXIT 3 times to return to the Home screen.



3.7 Disable Daylight Savings Time: – Fast Track

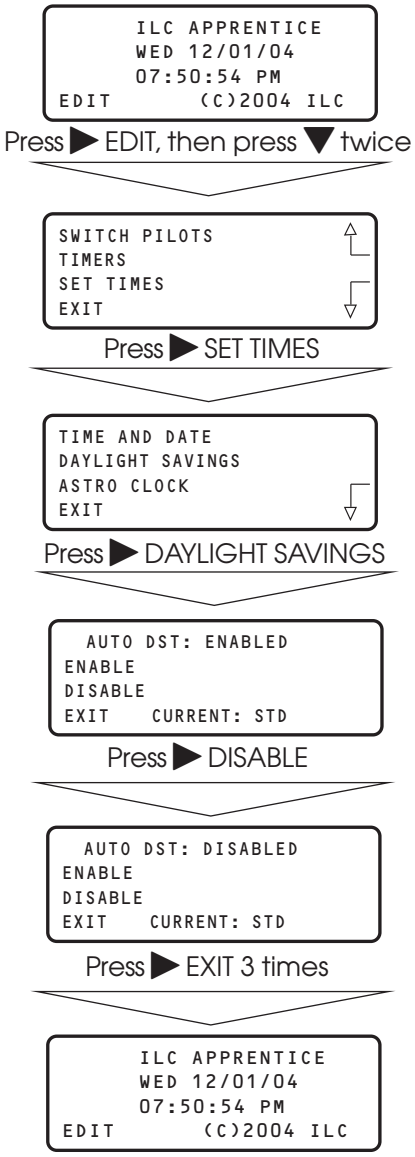


Daylight Savings Screen Flow

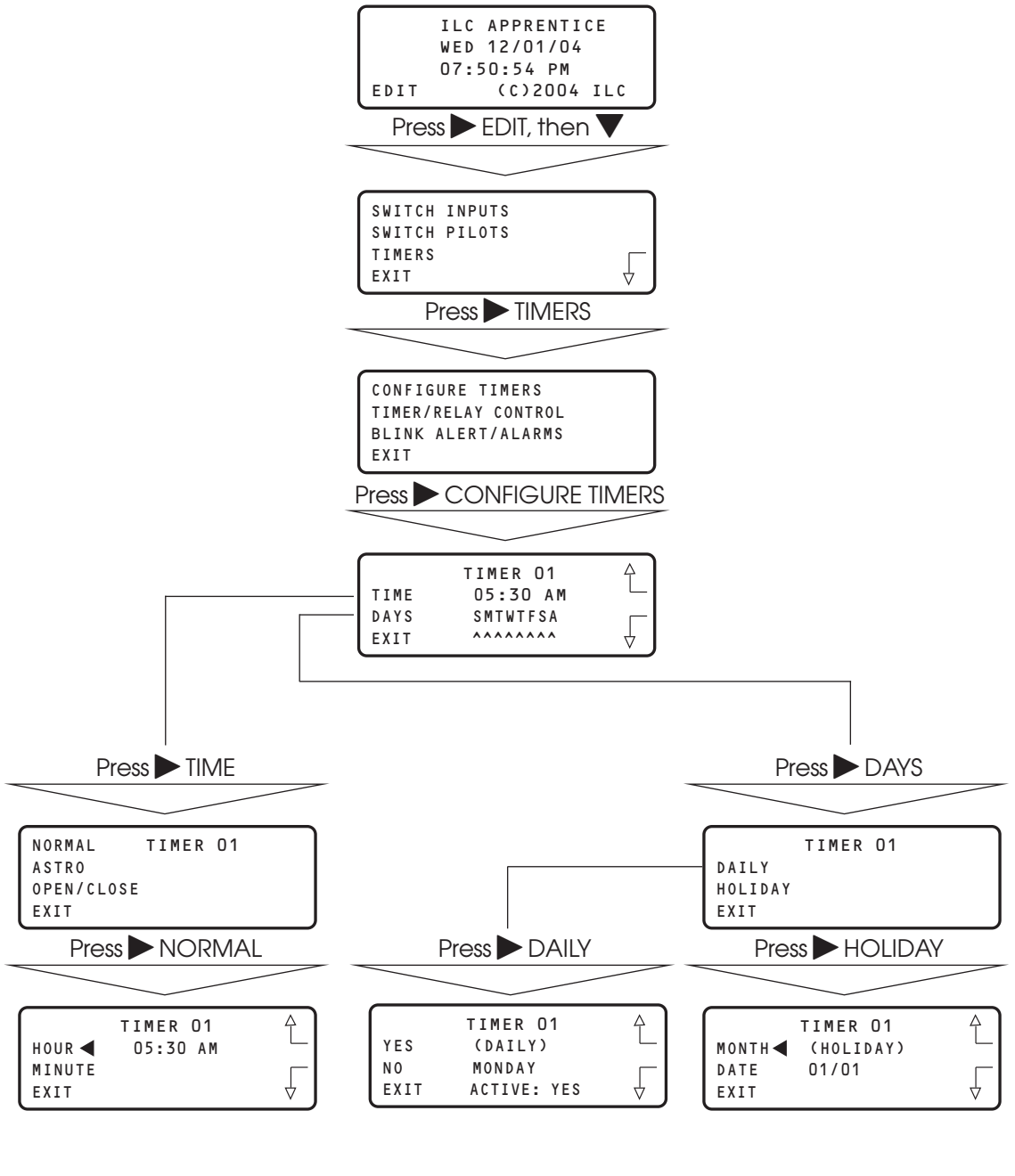
How to Enable and Disable Day Light Savings

The ILC Apprentice is defaulted for automatic change over between standard and day light savings time. If the controller is in an area that doesn't observe day light savings you can disable this feature.

1. From the Home screen, press ▶ EDIT, then press ▼ twice.
2. From the main menu, press ▶ SET TIMES.
3. From the Set Times menu, press ▶ DAYLIGHT SAVINGS.
4. When the Day Light Savings screen appears, press ▶ DISABLE.
5. Press ▶ EXIT 3 times to return to the Home screen.

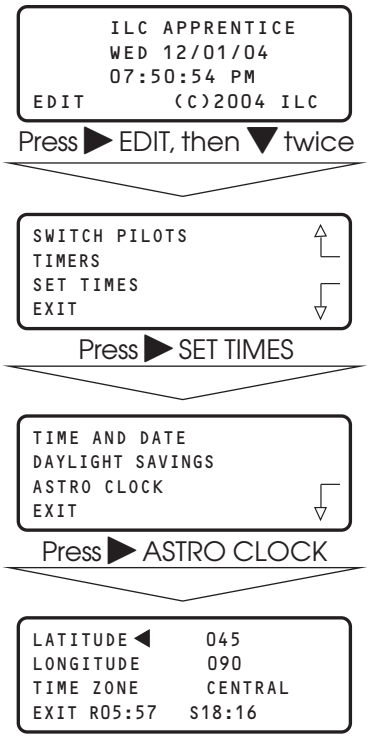


3.8 Time Based Operations: How to Define a Normal Timer – Fast Track



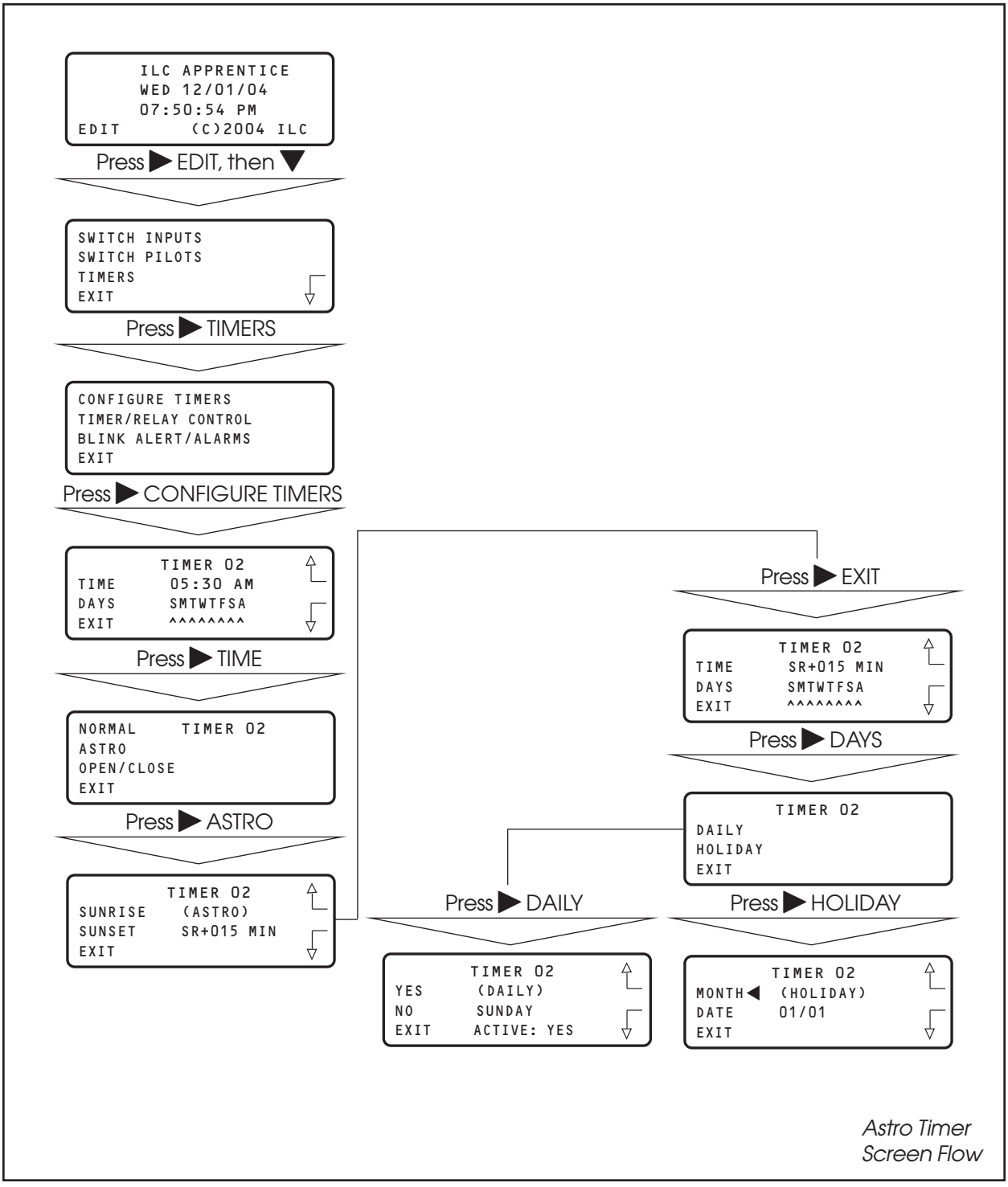
Time Based Operations Screen Flow

Time Based Operations: How to Set the Astro Clock Parameters – Fast Track



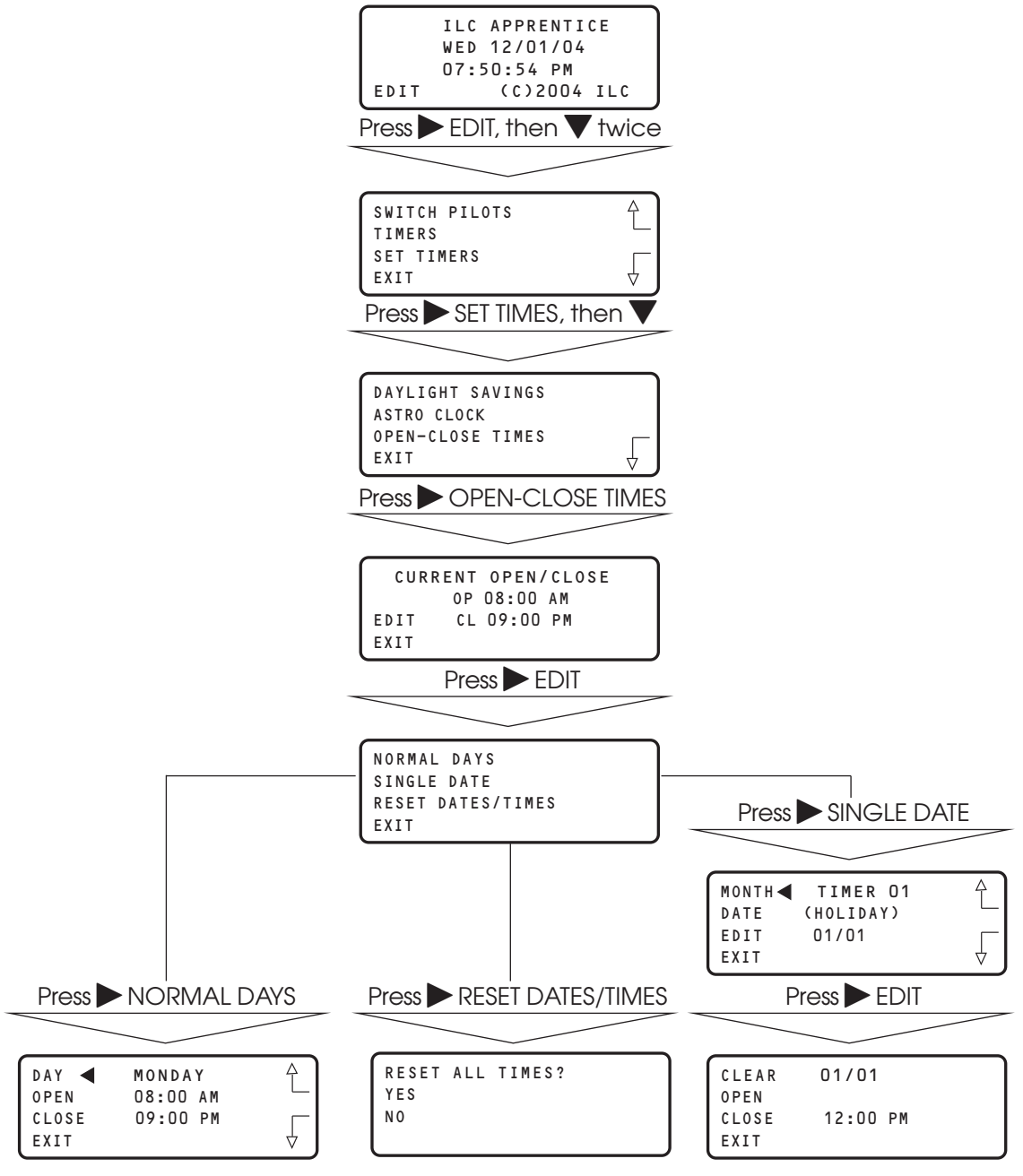
Astro Clock Screen Flow

3.8 Time Based Operations: How to Define an Astro Timer – Fast Track



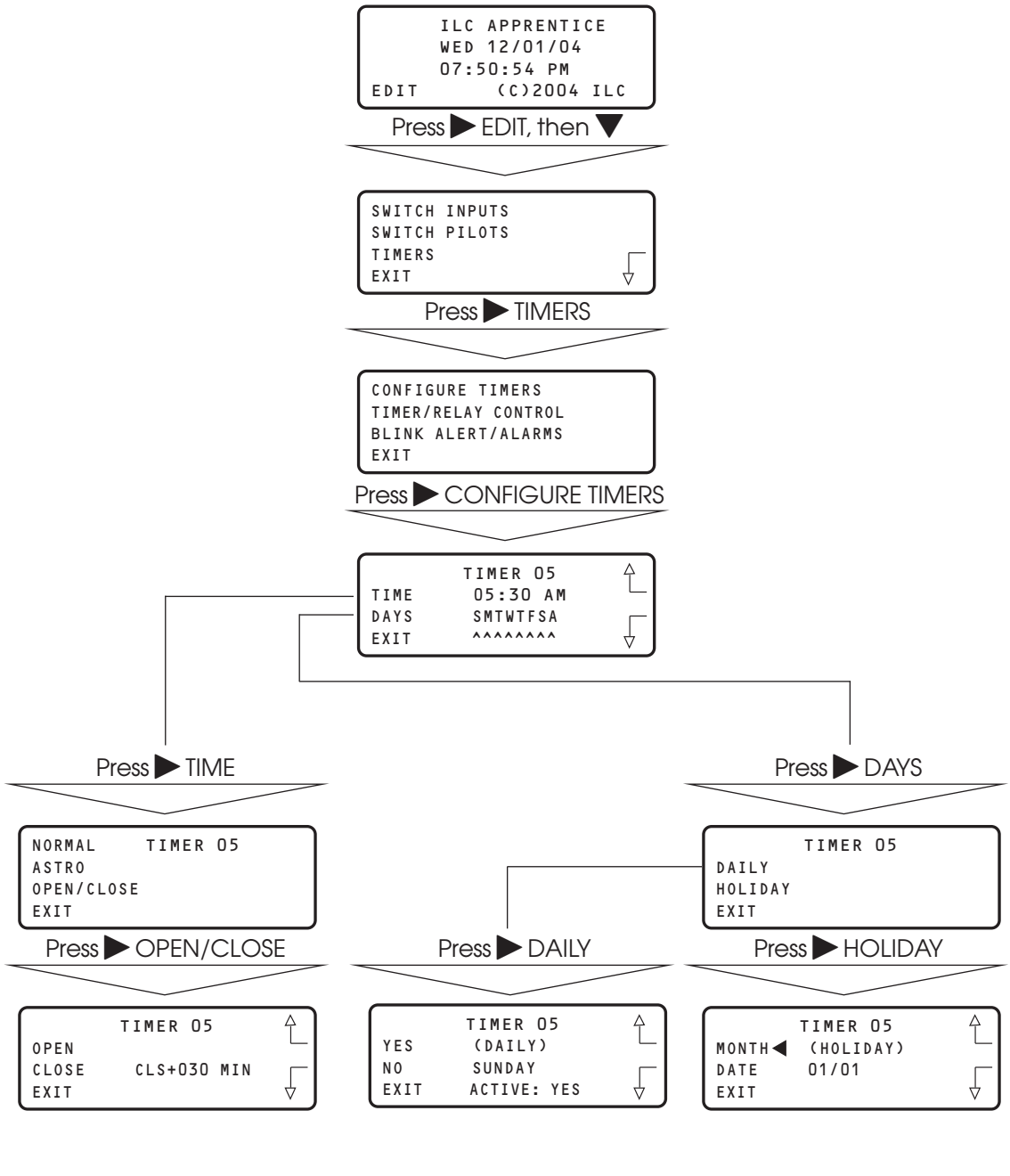
Astro Timer Screen Flow

3.8 Time Based Operations: How to Set Open/Closed Parameters – Fast Track



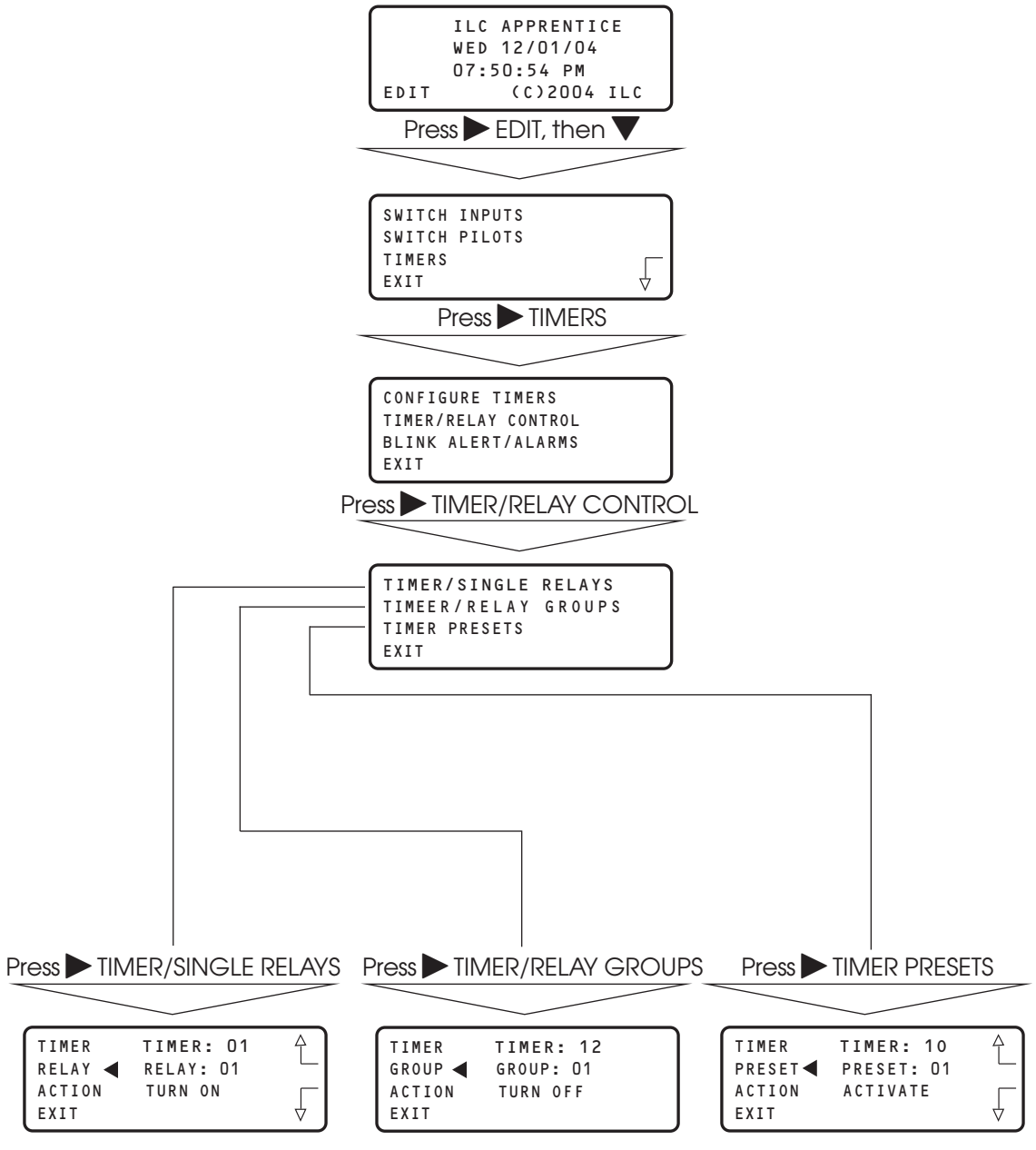
Open/Close Parameters Screen Flow

3.8 Time Based Operations: How to Define an Open/Close Timer – Fast Track



Open/Close Timer Screen Flow

3.8 Time Based Operations: How to Control a Relay, Relay Group or a Preset with a Timer – Fast Track



Timer Control Screen Flow

Time Based Operations

CONCEPTS AND PARAMETERS

You can program the ILC Apprentice controller to control a single relay output, a relay group, or a preset according to a time based schedule. (A preset is user defined group of relays programmed to assume a pre-determined ON/OFF pattern when invoked. Presets will be discussed later in more detail.)

Time based control involves:

1. Defining the timer and any associated parameters.
2. Programming how the timer impacts the selected relay, relay group, or preset.

NOTE: You will need the latitude and longitude for your location in order to define an Astro Timer. A listing of latitudes and longitudes for many major US cities is provided in the Appendix O.

Parameter Key:

TIMER = 1 of up to 48 time based events that impact relays, relay groups, or presets. A NORMAL timer executes its function according to standard AM/PM time. This the default timer type. An ASTRO timer operates in relation to sunrise or sunset. An OPEN/CLOSE timer is keyed to user entered facility open and close times. (Both ASTRO and OPEN/CLOSE timers can be programmed to occur at exactly sunrise/sunset open/close or offset either before or after these times.) Open/Close Timers can be keyed to different open/close times. For example weekday hours as opposed to weekend hours. An Open/Close timer can also be programmed to execute on a specific date.

RELAY = one of 48 available relay outputs impacted by the timers

RELAY GROUP = one of 48 available user defined groups of relay outputs that respond as a group to a timer

PRESET = one of 48 available user defined ON/OFF relay output patterns activated by a timer.

ACTION = How the timer will impact the relay output, relay group, or preset. The default is NO ACTION (The timer has no effect on the relay, relay group, or preset.) Other possible entries are:

TURN ON (used with relays and relay groups)
TURN OFF (used with relays and relay groups)
ACTIVATE (used with presets)

SAMPLE OPERATION:
Program a Normal Timer

Define the Normal Timer:

1. From the Home screen, press ▶ EDIT; then ▼.

2. From the Main Menu press ▶ TIMERS.

3. When the Timer menu appears, press ▶ CONFIGURE TIMERS.

4. When the Timer Definition screen appears, press ▲ or ▼ until the timer you want to program appears in the timer field.

5. Press ▶ TIME; then when the Timer type menu appears, press ▶ NORMAL.

6. When the Set Time screen appears, press ▶ HOUR, then ▲ or ▼until the hour for the timer to occur appears.

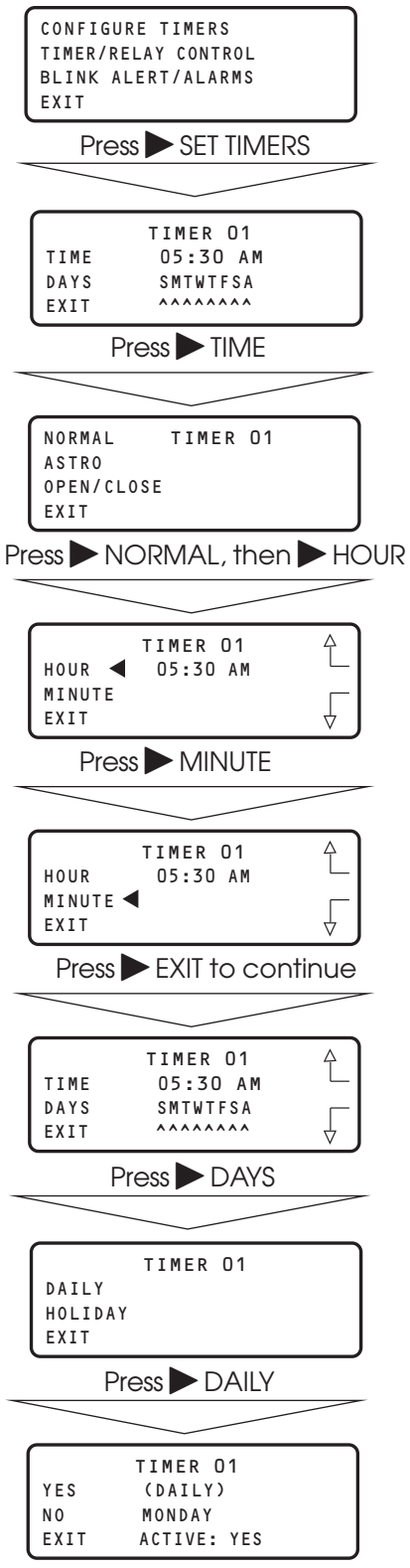
7. Press ▶ MINUTE, then ▲ or ▼ until the correct time appears on the screen.

8. Press ▶ EXIT to return to the Timer Definition screen.

9. Press ▶ DAYS; when the Day menu appears press ▶ DAILY.

10. Day Choice screen appears, press ▲ or ▼ and then ▶ YES or ▶ NO to include or exclude each day from the timer operation.

11. Press ▶ EXIT 2 times to return to the TIMER menu.



SAMPLE OPERATION:
Program an Astro Timer

Step 1: Enter The Astro Clock Parameters:

1. From the Home screen, press ▶ EDIT; then press ▼ twice.

2. From the Main Menu press ▶ SET TIMES.

3. From the Set Times Menu, press ▶ ASTRO CLOCK.

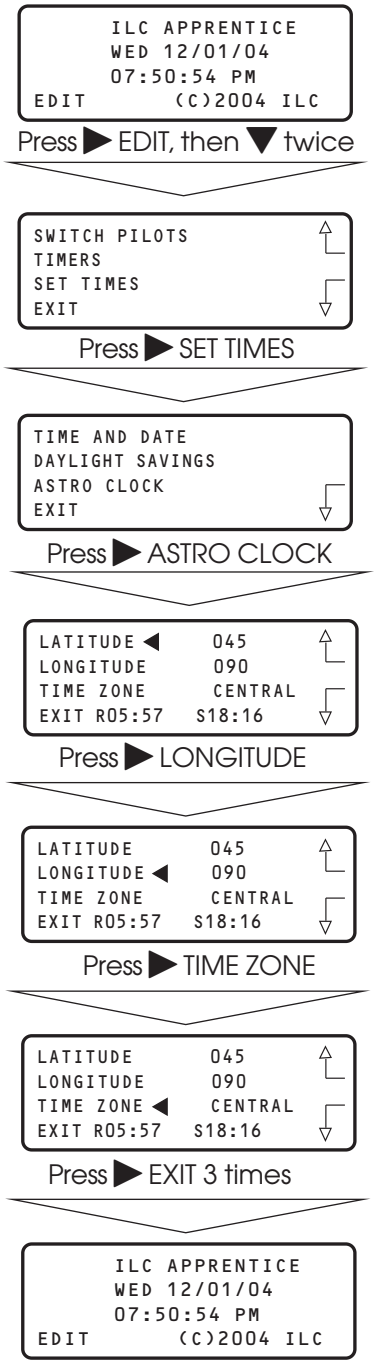
4. When the Astro Clock screen appears, press ▲ or ▼ until the proper latitude appears.

5. Press ▶ LONGITUDE; then ▲ or ▼ until the proper longitude appears.

6. Press ▶ TIME ZONE then ▲ or ▼ until the proper time zone appears.

7. Press ▶ EXIT 3 times to return to the Home screen.

Note: The current sunrise and sunset times for the global coordinates selected appear at the bottom of the Astro Clock screen (R and S). (The default coordinates are for Minneapolis Minnesota.)



SAMPLE OPERATION:
Program an Astro Timer

Step 2: Define the Astro Timer:

1. From the Home screen, press ▶ EDIT; then ▼.

2. From the Main Menu press ▶ TIMERS.

3. When the Timer menu appears, press ▶ CONFIGURE TIMERS.

4. When the Timer Definition screen appears, press ▲ or ▼ until the timer you want to program appears in the timer field.

5. Press ▶ TIME; then when the Timer type menu appears, press ▶ ASTRO

6. When the Astro Time Set screen appears press either ▶ SUNRISE(to set the time in relation to sunrise) or ▶ SUNSET (to key the timer to sunset). If you want to offset the time press either ▲ or ▼ until the desired offset appears on the screen. Then press ▶ EXIT to return to the Timer Definition screen.

7. Press ▶ DAYS; when the Day menu appears press ˜ DAILY.

8. Day Choice screen appears, press ▲ or ▼ and then ▶ YES or ▶ NO to include or exclude each day from the timer operation.

9. Press ▶ EXIT 2 times to return to the TIMER menu.

SAMPLE OPERATION:
Program an Open/Close Timer

Step 1: Define the Open/Close Parameters:

1. From the Home screen, press ▶ EDIT; the press ¸.

2. From the Main Menu press ▶ SET TIMES.

3. From the Set Times Menu, press ▼; then press ▶ OPEN-CLOSE TIMES.

4. When the top level Open/Close screen appears, press ▶ EDIT

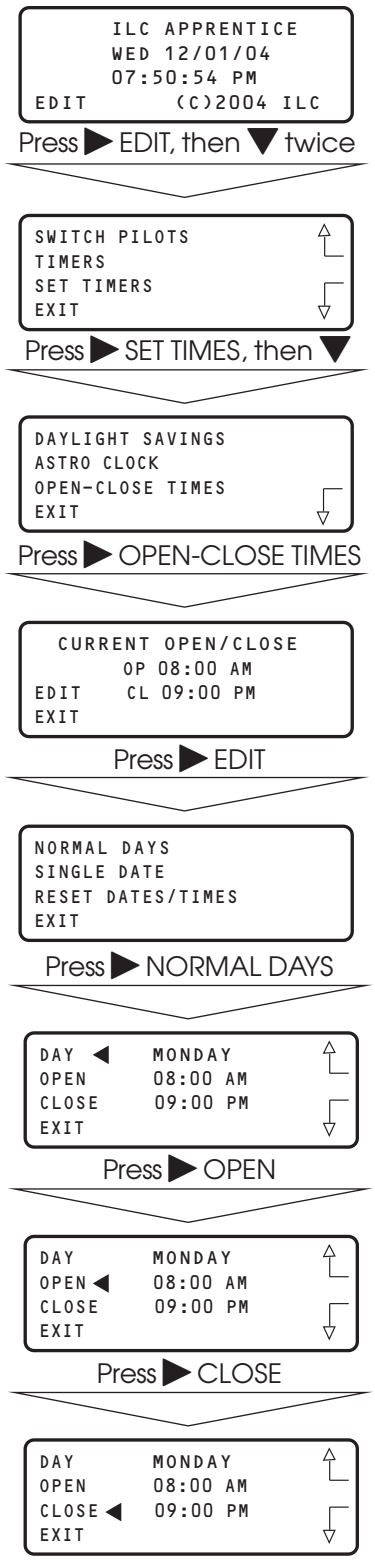
5. When the Open/Close Day menu appears, press ▶ NORMAL DAYS

6. When the Open/Close Time Setting screen appears, press ▶ OPEN; then press ▲ or ▼ to set the open time of the facility for the day that appears in the day field.

7. Press ▶ CLOSE; then press ▲ or ▼ to set the close time of the facility for the day that appears in the day field.

8. Press ▶ DAY to access the next day; the repeat steps 5 and 6 for that day.

9. After finishing setting all the open and close times for the facility, press ▶ EXIT 5 times to return to the Home screen.



SAMPLE OPERATION:
Program an Open/Close Timer

Step 2: Define the Open/Close Timer:

1. From the Home screen, press ▶ EDIT; then ▼.

2. From the Main Menu press ▶ TIMERS.

3. When the Timer menu appears, press ▶ CONFIGURE TIMERS.

4. When the Timer Definition screen appears, press ▲ or ▼ until the timer you want to program appears in the timer field.

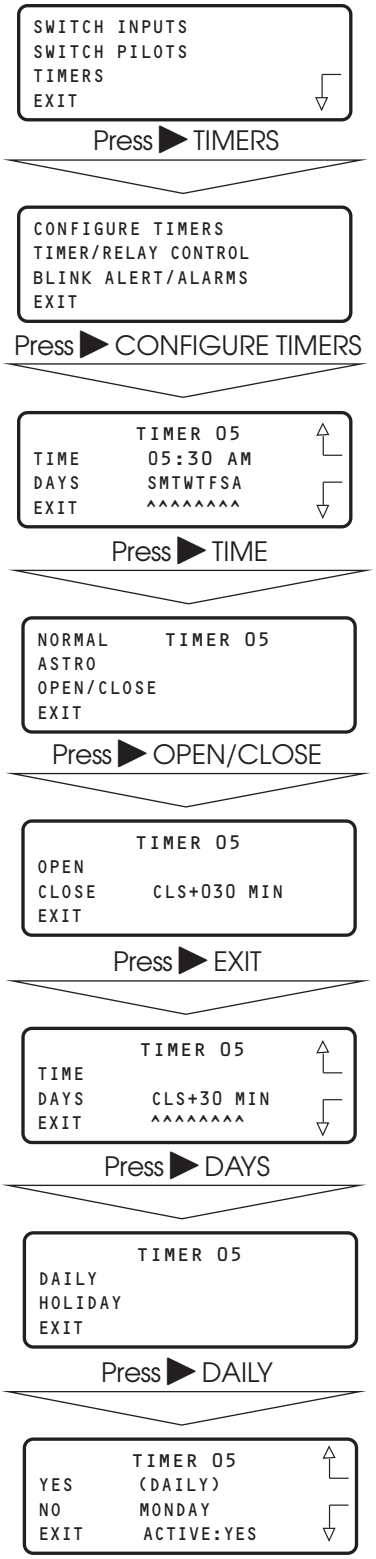
5. Press ▶ TIME; then when the Timer Type menu appears, press ▶ OPEN/CLOSE.

6. When the Open/Close Set screen appears, press either ▶ OPEN or ▶ CLOSE to tie the timer to either the facility open or closing time. If you desire to offset the time press ▲ or ▼ until the correct offset appears on the screen. Then press ▶ EXIT to return to the Timer Definition screen.

7. Press ▶ DAYS; when the Day menu appears press ▶ DAILY.

8. Day Choice screen appears, press ▲ or ▼ and then ▶ YES or ▶ NO to include or exclude each day from the timer operation.

9. Press ▶ EXIT 2 times to return to the TIMER menu.



SAMPLE OPERATION:
Program a Timer to Control a Single Relay

Program a Timer to Control a Relay:

1. From the Timer menu, press ▶ TIMER/RELAY CONTROL.

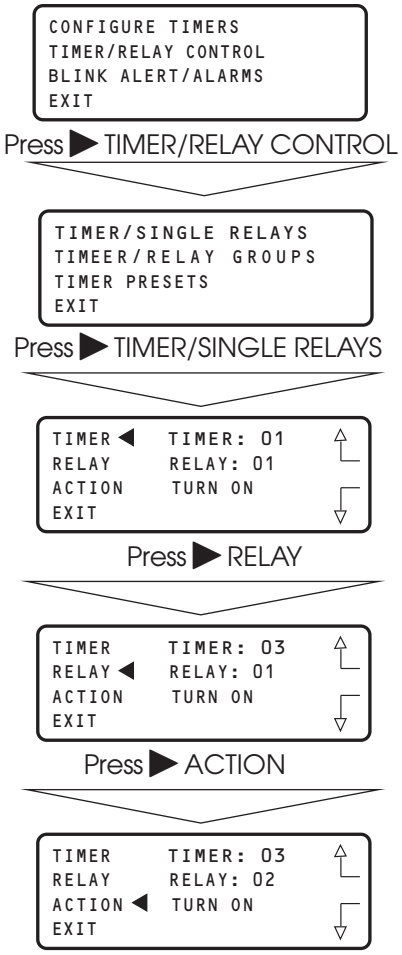
2. From the Timer Control menu, press ▶ TIMER/SINGLE RELAYS.

3. When the Timer/Relay Control screen appears, press ▲ or ▼ until the timer that you want to control the relay appears in the timer field.

4. Press ▶ RELAY; then ▲ or ▼ until the relay you want to be controlled by the timer appears in the relay field.

5. Press ▶ ACTION; then ▲ or ▼ until the the way you want the timer to control the relay appears.

6. Press ▶ EXIT 4 times to return to the Home screen.



SAMPLE OPERATION:
Program a Timer to Control a Relay Group

Program a Timer to Control a Relay Group:

1. From the Timer menu, press ▶ TIMER/RELAY CONTROL.

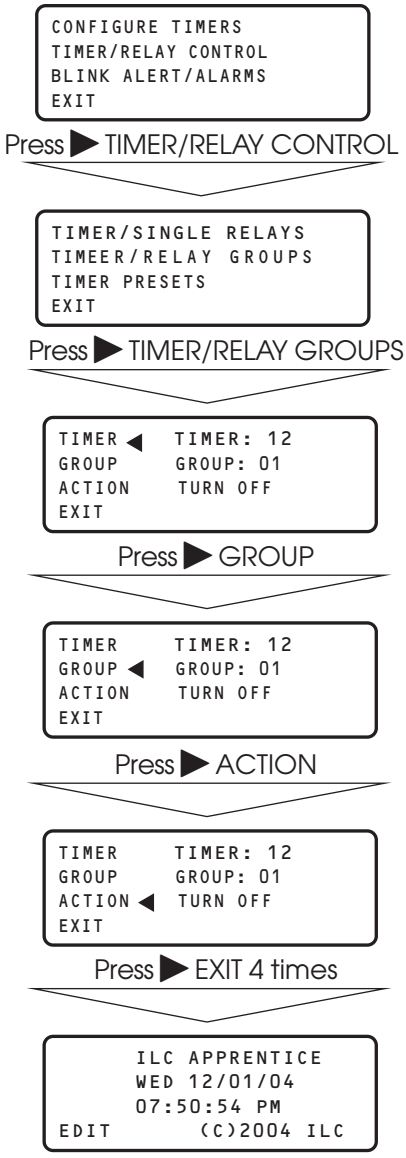
2. From the Timer Control menu, press ▶ TIMER/RELAY GROUPS

3. When the Timer/Relay Group Control screen appears, press ▲ or ▼ until the timer that you want to control the relay group appears in the timer field.

4. Press ▶ GROUP; then ▲ or ▼ until the relay group you want to be controlled by the timer appears in the relay field.

5. Press ▶ ACTION; then ▲ or ▼ until the way you want the timer to control the relay group appears.

6. Press ▶ EXIT 4 times to return to the Home screen.



SAMPLE OPERATION:
Program a Timer to Control a Preset

Program a Timer to Control a Preset:

1. From the Timer menu, press ▶ TIMER/RELAY CONTROL.

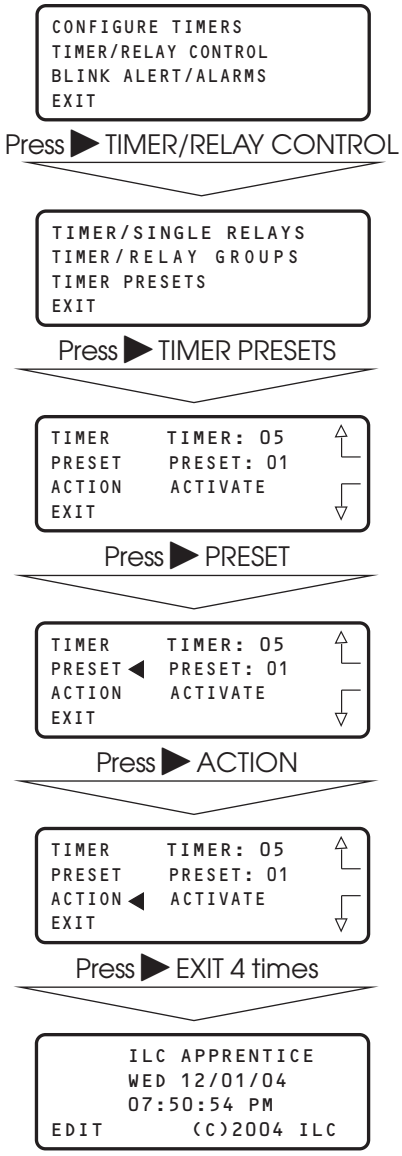
2. From the Timer Control menu, press ▶ TIMER/PRESETS

3. When the Timer/Preset Control screen appears, press ▲ or ▼ until the timer that you want to control the preset appears in the timer field.

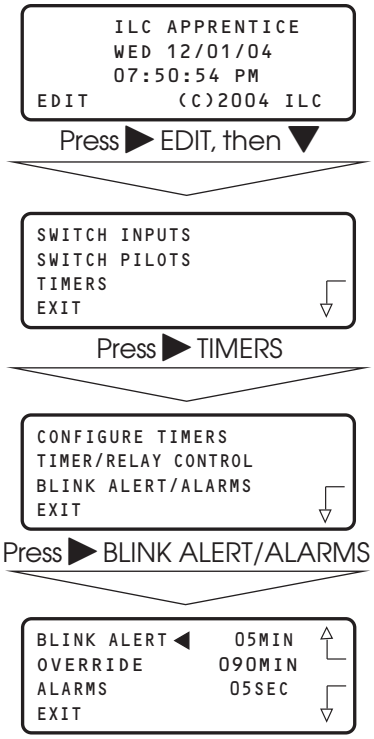
4. Press ▶ PRESET; then ▲ or ▼ until the preset you want to be controlled by the timer appears in the relay field.

5. Press ▶ ACTION; then ▲ or ▼ until the way you want the timer to control the preset appears.

6. Press ▶ EXIT 4 times to return to the Home screen.



3.9 Blink Alert/Alarms – Fast Track



Blink Alert/Alarms Screen Flow

Blink Alert/Alarms

CONCEPTS AND PARAMETERS

If the default timing parameters for the *optional* blink alert, HID delay and alarm relay output timer options are not appropriate for your application, you can change them. If the defaults are appropriate you need not conduct operations in this area.

Parameter Key:

BLINK ALERT = The length of time between a blink alert, HID delay or alarm and the execution of an OFF timer or blink alert switch signal, that has not been overridden by a switch closure. The default is 5 minutes. Other choices are from 2-99 minutes.

OVERRIDE = The amount of time a switch closure can be programmed to postpone the execution of an OFF timer or blink alert switch signal. The default is 120 minutes. Other choices are from 5 minutes to 999 minutes.

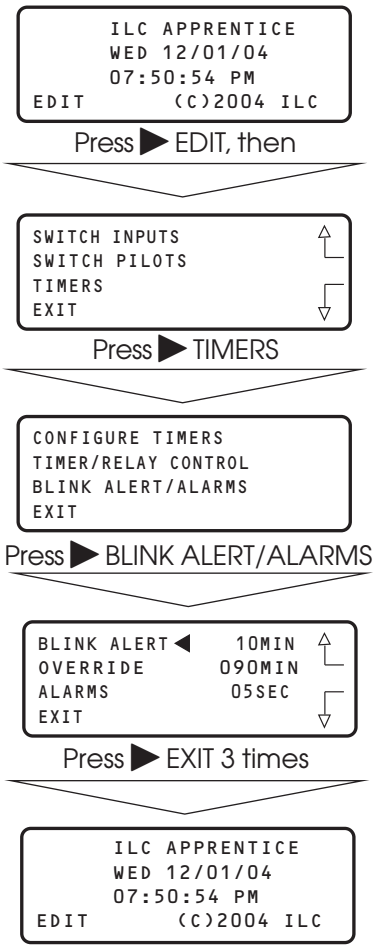
ALARMS = The length of the pulse for momentary alarm signals. The default is 5 seconds. Other choices are from 1--99 seconds.

CONFIGURE TIMED-ON = Whether the timed on period is invoked by a switch opening or closing

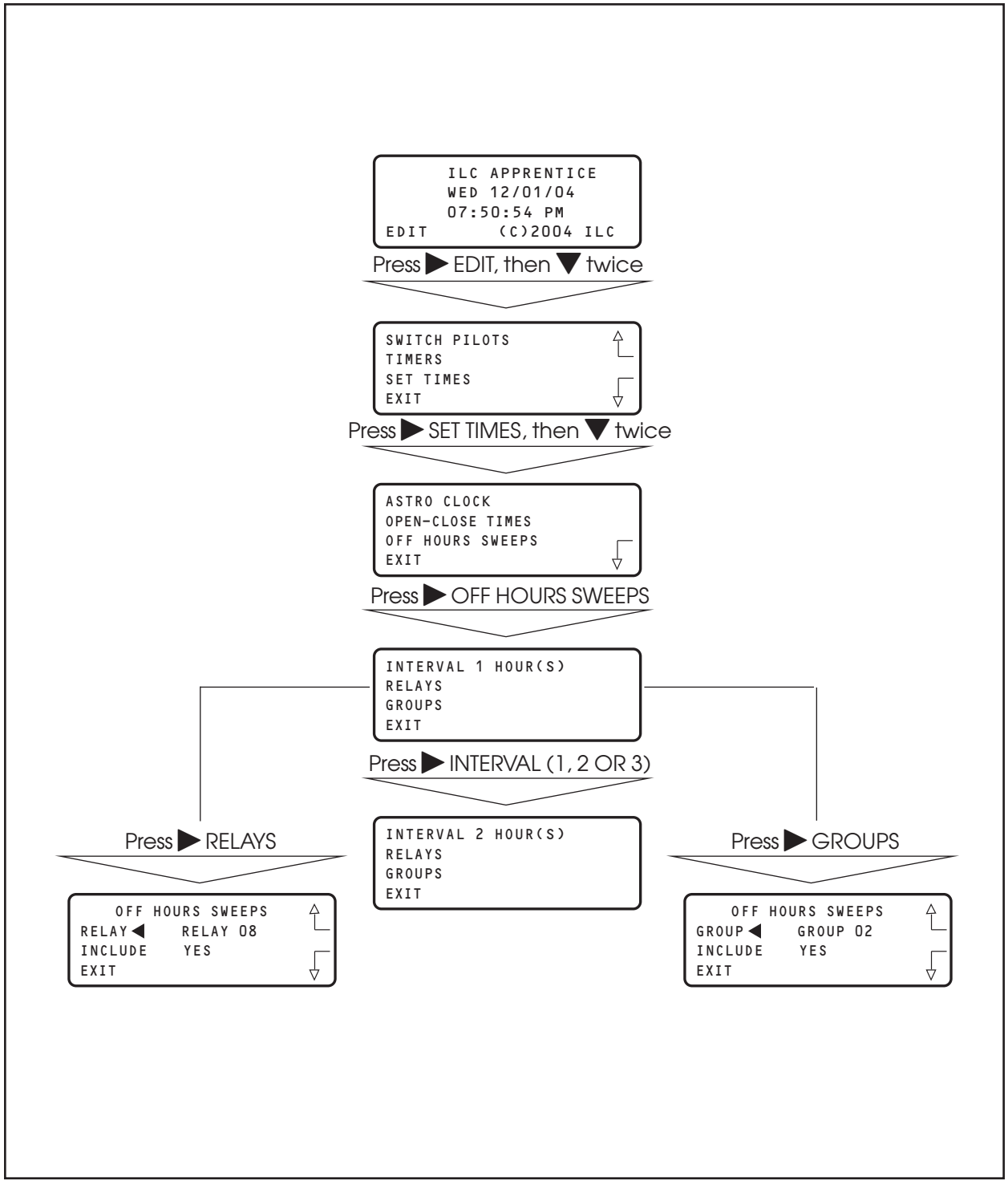
FORCE TIMERS = Execute the selected timer

SAMPLE OPERATION:
Change the Blink Alert from the Default

1. From the Home screen, press ▶ EDIT; then ▼.
2. When the Main menu appears, press ▶ TIMERS.
3. When the Timer menu appears, press ▶ BLINK ALERT/ALARMS.
4. When the Blink Alert/Alarms screen appears, press ▲ or ▼ until the desired Blink Alert time appears in the Blink Alert field.
5. Press ▶ EXIT three times to return to the Home screen.



3.10 Off Hours Sweeps – Fast Track



Off Hours Sweeps

CONCEPTS AND PARAMETERS

You can program the controller to execute OFF sweeps to insure that single relay outputs and relay groups will be turned OFF at regular intervals outside of normal business hours. (NOTE: This is used in conjunction with Open/Close Times - see Page 3-28 and 3-35.)

Parameter Key:

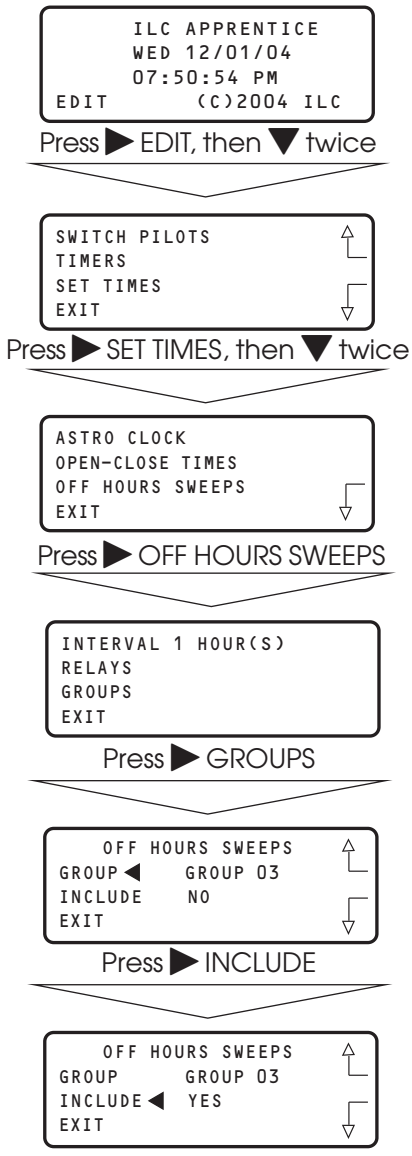
INTERVAL = time between OFF sweeps (1, 2, 3 hours).

Relays = individual relays subject to the OFF sweeps

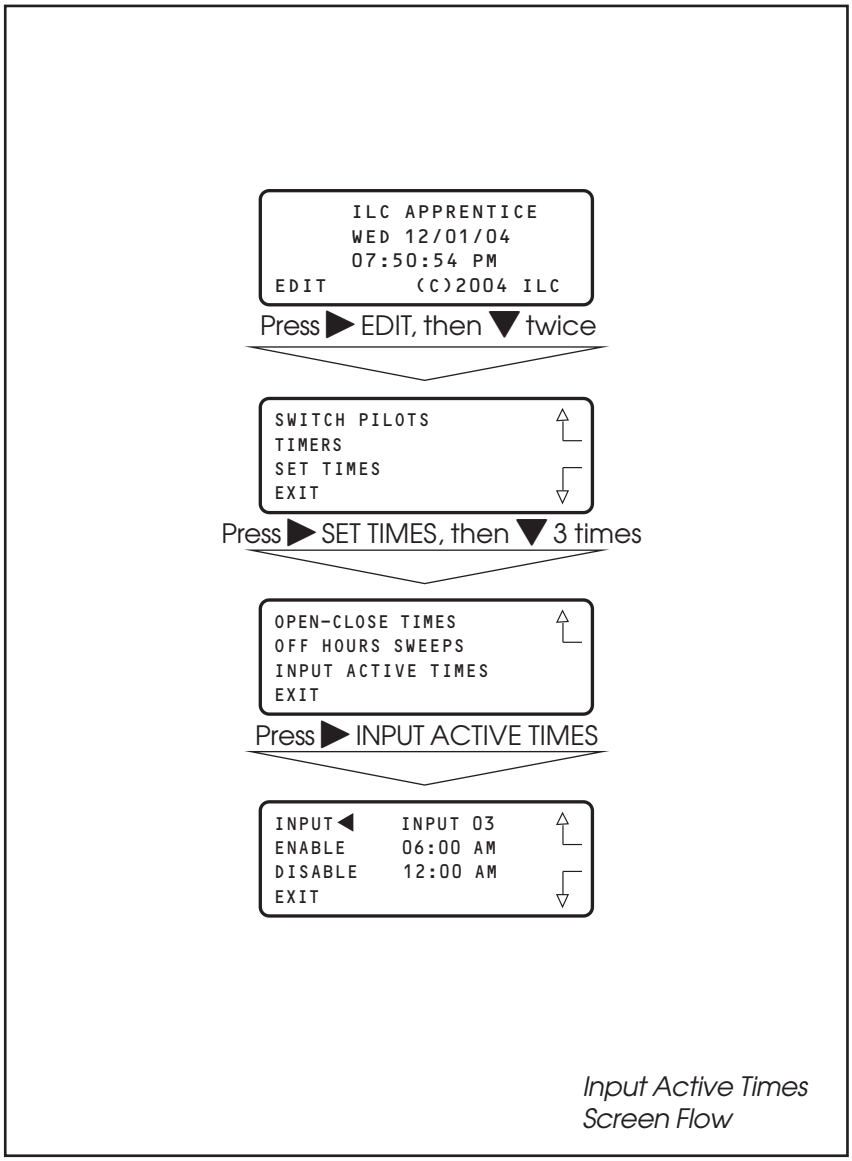
Groups = relay groups subject to the OFF sweeps

SAMPLE OPERATION:
Program a Relay Group for Off Sweeps

1. From the Home screen, press ▶ EDIT; then press ▼ twice.
2. When the Main menu appears, press ▶ SET TIMES; then ▼ twice.
3. When the SET TIMES Menu appears, press ▶ OFF HOURS SWEEPS
4. When the Off Hours Sweep menu appears, press ▶ GROUPS
5. When the Off Sweep Group screen appears, press ▲ or ▼ to select the relay group subject to the Off sweep.
6. Press ▶ INCLUDE until YES appears.
7. Press ▶ EXIT 4 times to return to the Home screen.



3.11 Input Active Times – Fast Track



Input Active Times Screen Flow

Input Active Times

CONCEPTS AND PARAMETERS

You can program the controller to enable/ disable selected input(s) during certain hours. During the enable time, the input will function normally. During the disable hours, the input will not function

Parameter Key:

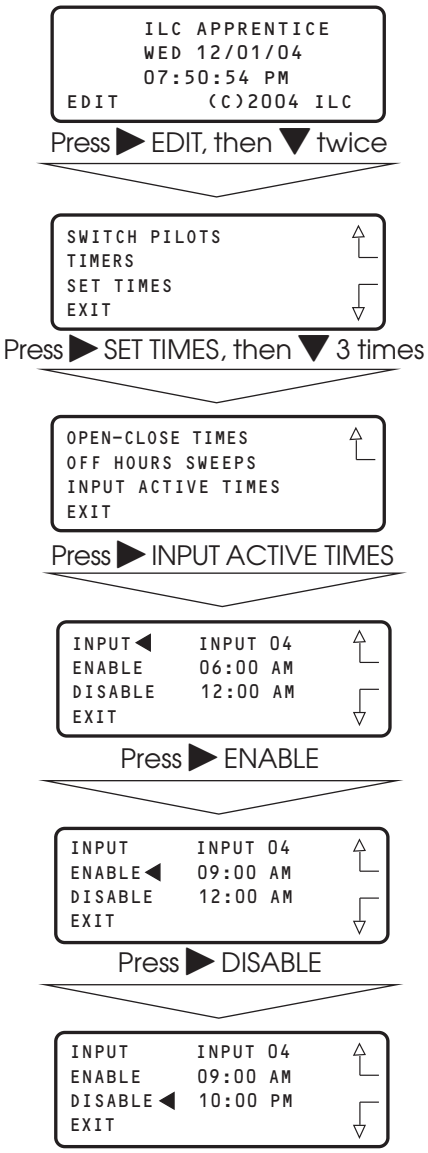
Input = one of up to 48 possible controller switch inputs

Enable = the input will function from the entered enable time to the entered disable time

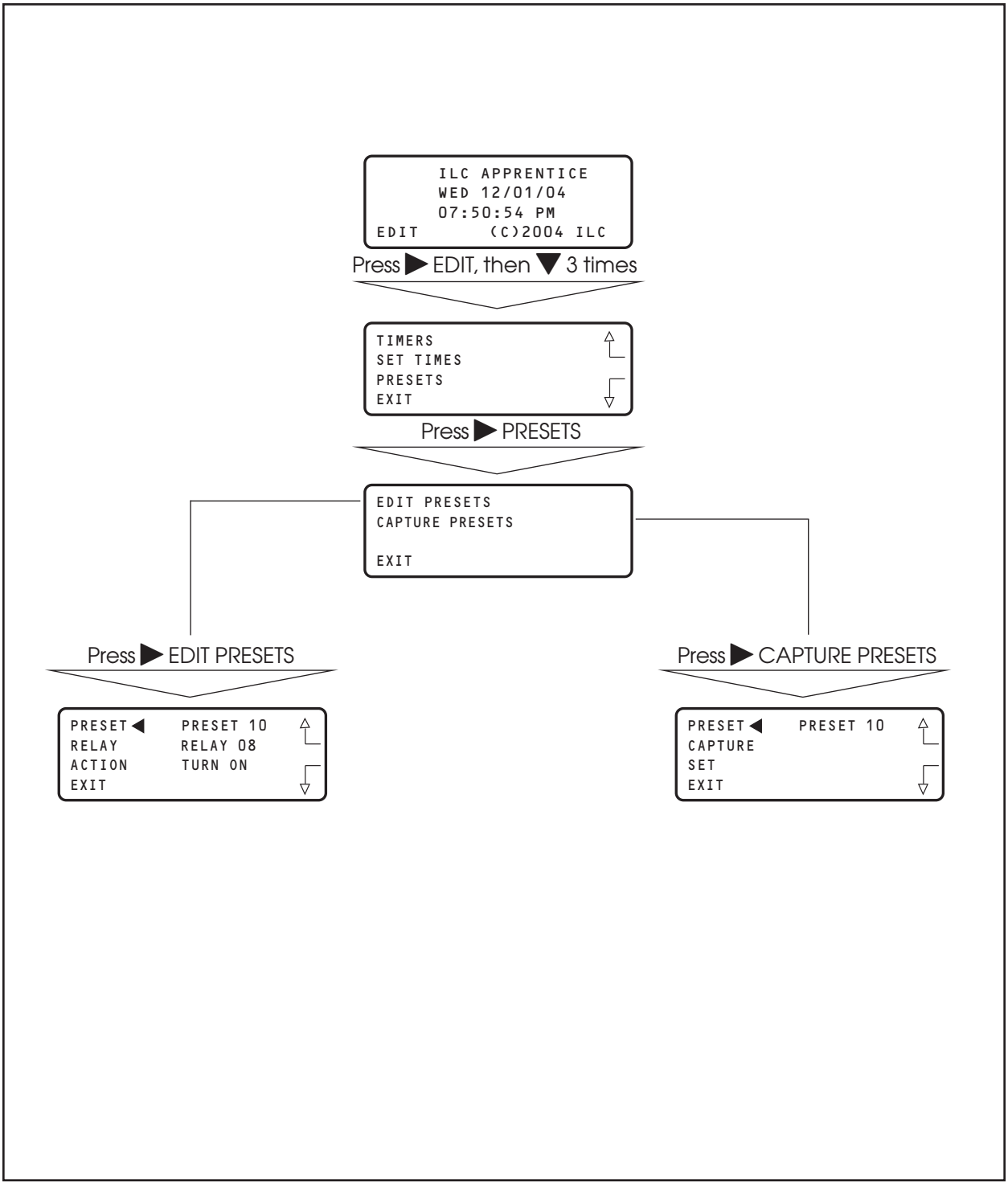
Disable = the input will NOT function from the entered disable time to the entered enable time

SAMPLE OPERATION:
Program a Switch Input for Input Active Times

1. From the Home screen, press ▶ EDIT; then press ▼ twice.
2. When the Main menu appears, press ▶ SET TIMES; then ▼ 3 times.
3. When the SET TIMES Menu appears, press ▶ INPUT ACTIVE TIMES.
4. When the Input Active Times screen appears press ▲ or ▼ until the input you want to program appears in the input field.
5. Press ▶ ENABLE; then press ▲ or ▼ until the desired enable time appears.
6. Press ▶ DISABLE; then press ▲ or ▼ until the desired disable time appears.
7. Press ▶ EXIT three times to return to the Home screen.



3.12 Preset Operations – Fast Track



Preset Operations

CONCEPTS AND PARAMETERS

The ILC Apprentice supports the ability to save the current relay output ON/OFF states in a preset scene. You can program the controller to execute this scene by keyboard command, a signal from a Set Preset switch type, or timer signal. You also have the ability to edit the preset if you need to change the ON/OFF pattern

Parameter Key:

CAPTURE PRESETS:

PRESET = one of a possible 48 ON/OFF relay output patterns.

CAPTURE = save the current relay ON/OFF states to a preset scene

SET = a keyboard command to invoke a captured preset

EDIT PRESETS:

RELAY = one of 48 possible relay outputs making up the preset

ACTION = The state you want the relay output to assume when the preset is invoked.

SAMPLE OPERATION:
Capture, EDIT, and Invoke a Preset

1. From the Home screen, press ▶ EDIT; then press ▼ three times.

2. When the Main menu appears press ▶ PRESETS.

3. When the Presets menu appears, press ▶ CAPTURE PRESETS.

4. When the Preset Capture screen appears, press ▲ or ▼ until the preset you want to capture appears in the preset field.

5. Press ▶ CAPTURE to save the current ON/OFF relay pattern as the preset.

6. Press ▶ EXIT to return to the Preset Menu.

7. Press ▶ EDIT PRESETS

8. When the Edit Presets screen appears, press ▲ or ▼ until the preset you previously captured appears in the preset field.

9. Press ▶ RELAY; then press ▲ or ▼ until the relay whose preset ON/OFF state you want to change appears.

10. Press ▶ ACTION; the press ▲ or ▼ until the desired relay state appears in the action field.

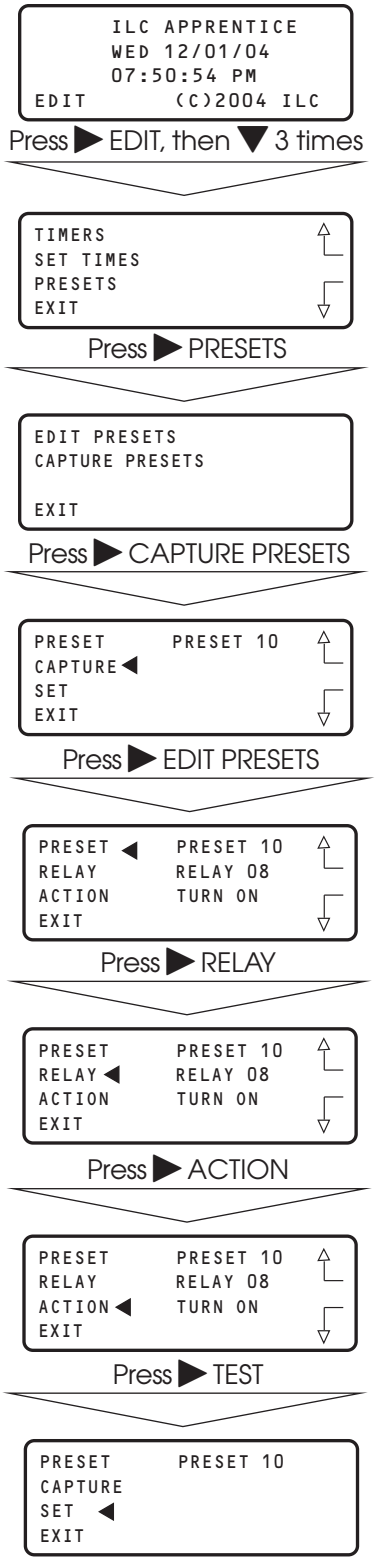
11. Repeat steps 9 and 10 for any additional relays you want to change.

12. Press ▶ EXIT to return to the Presets menu; then press ▶ CAPTURE PRESETS

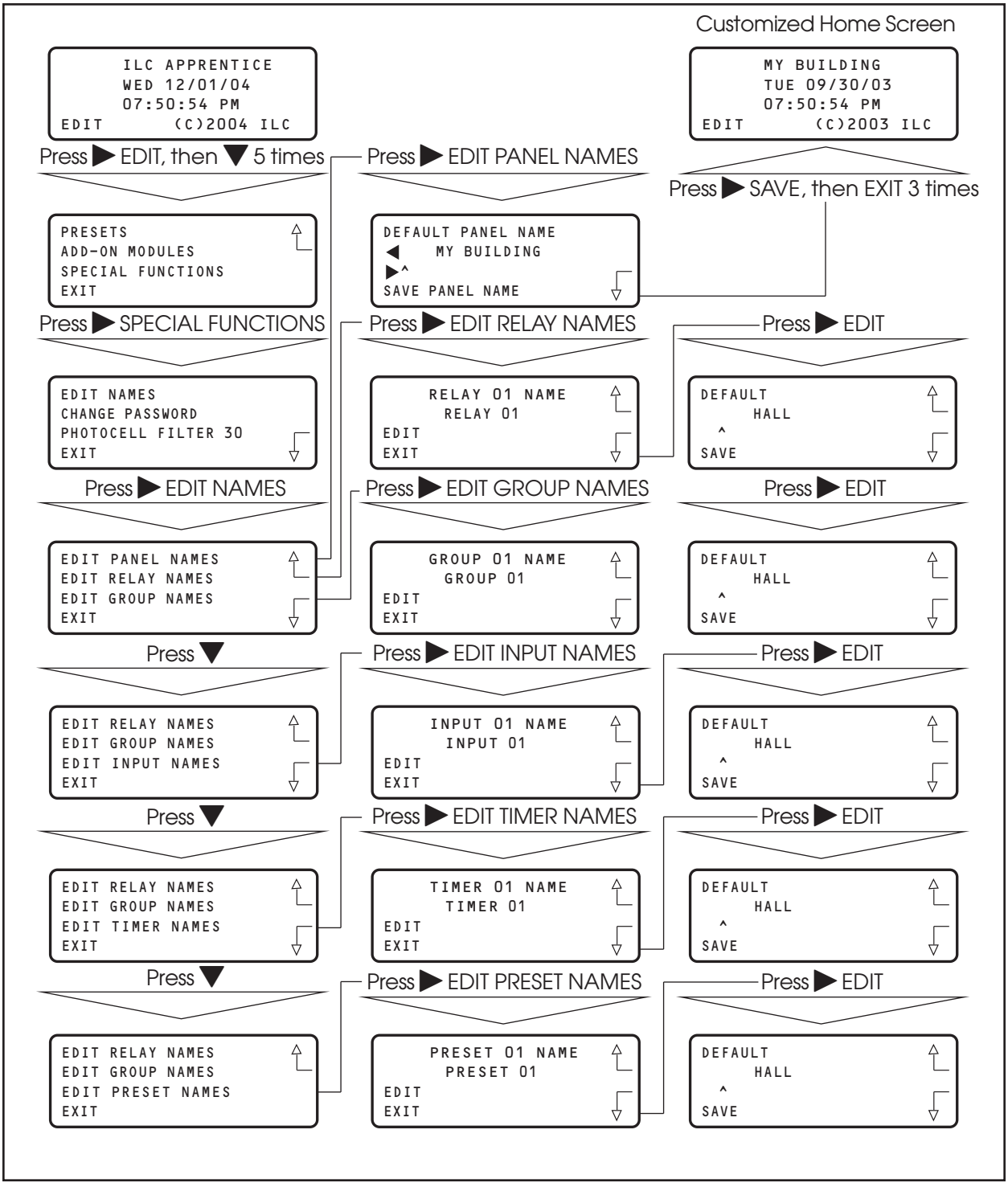
13. Press ▶ to select the preset you have just edited.

14. Press ▶ SET to invoke the preset.

15. Press ▶ EXIT 3 times to return to the Home screen.



3.13 Edit Names – Fast Track



How to Customize the Name(s) of the ILC Apprentice Controller, Relays, Groups, Inputs, Timers, and Presets

You have the option of assigning customized names to the controller and the other major components/features of the lighting control system. The customized names will appear on the screens featuring that component/feature.

SAMPLE OPERATION:
Customize The Name Of a Relay Output

1. From the Home screen, press ▶ EDIT; then press ▼ 5 times.

2. When the Main menu appears, press ▶ SPECIAL FUNCTIONS.

3. When the Special Functions menu appears, press ▶ EDIT NAMES.

4. When the Edit Names menu appears, press ▶ EDIT RELAY NAMES.

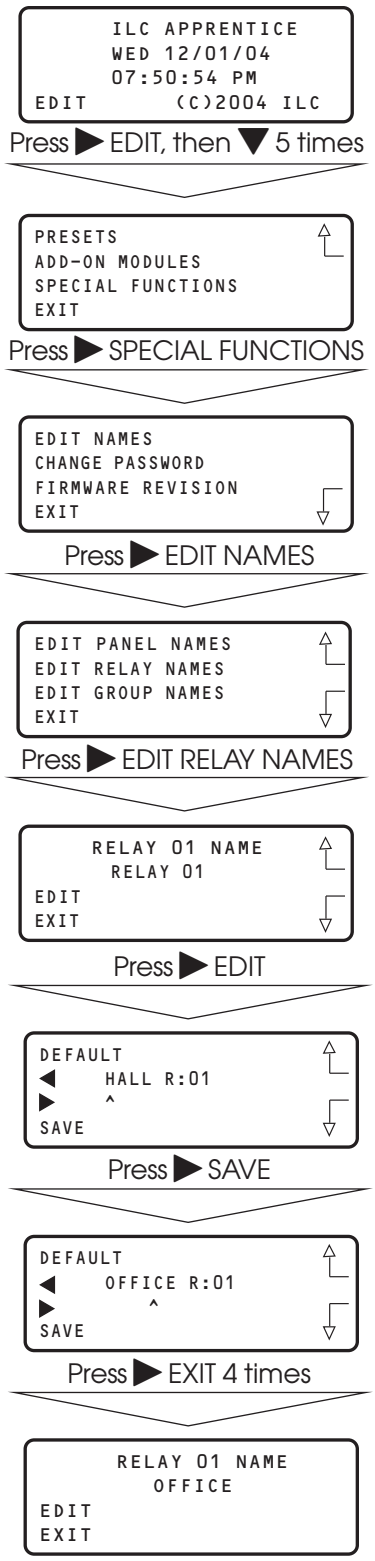
5. When the Relay Naming screen appears press ▲ or ▼ until the relay that you want to name appears.

6. Press ▶ EDIT

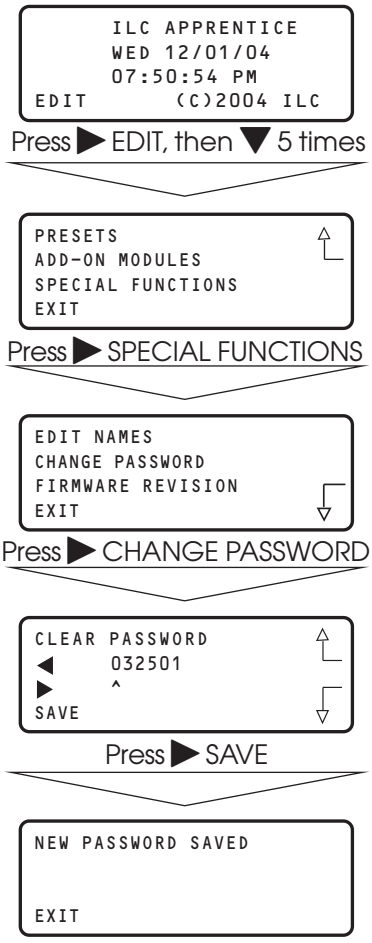
7. When the Relay Name Editing screen appears, press ▶ until the cursor is positioned under the first character of the default name. The press ▲ or ▼ until the first character of the customized name appears.

8. Repeat step 7 until the customized name has completely overridden the default name.

9. Press ▶ SAVE



3.14 How to Enter or Change a Password – Fast Track



Change Password Screen Flow

Entering/Changing a Password

CONCEPTS AND PARAMETERS

If you want, you can enter a 6 digit password to restrict unauthorized access to the controller.

Caution: Memorize and write down the password. Store it in a secure place. Once you have saved the password, you will need to enter it or be denied access to the controller.

SAMPLE OPERATION:
Enter a Password For the Controller

1. From the Home screen, press ▶ EDIT; then press ▼ 5 times.

2. When the Main menu appears, press ▶ SPECIAL FUNCTIONS.

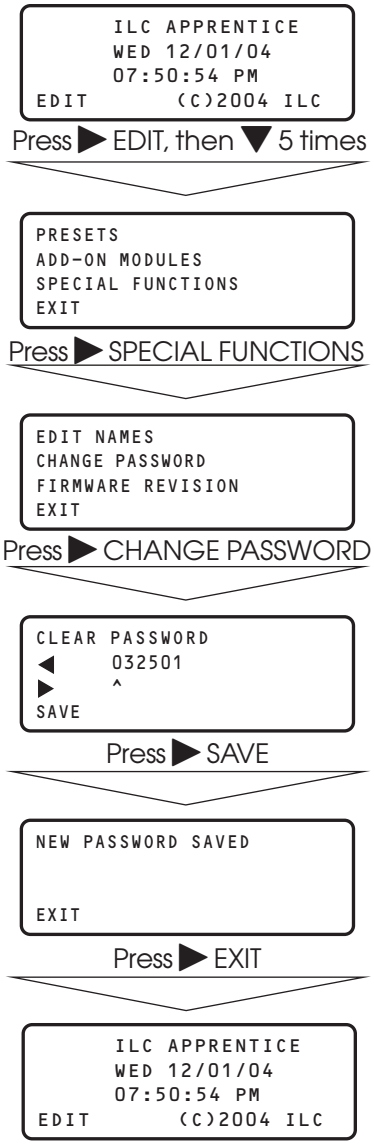
3. When the Special Functions menu appears, press ▶ CHANGE PASSWORD

4. When the Password Editing screen appears, press ▶ until the cursor is positioned under the first digit in the password field. The press ▶ or ▼ until the first digit of the password appears

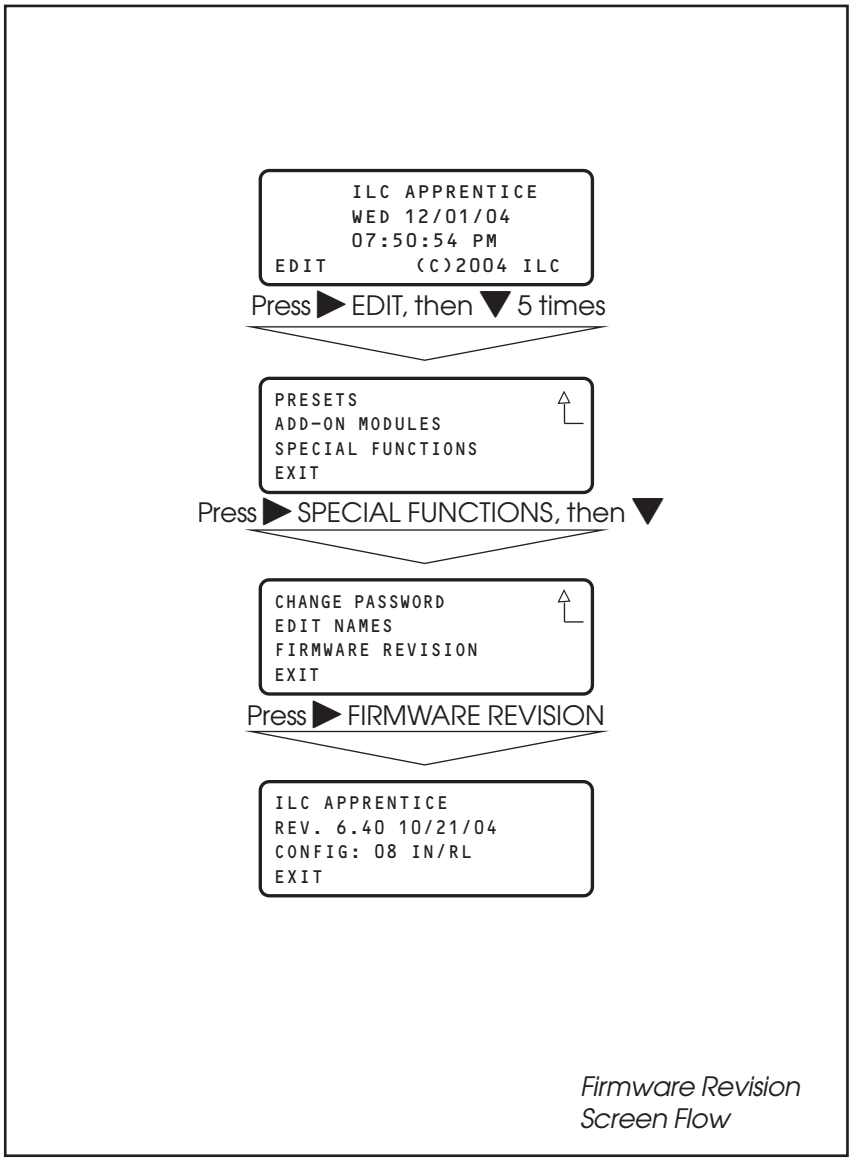
5. Repeat step 7 for the remaining digits.

6. Press ▶ SAVE. A message will appear saying NEW PASSWORD SAVED

7. Press ▶ EXIT to return to the Home screen



3.15 How to View the Firmware Revision– Fast Track



Firmware Revision Screen Flow

How to View The Controller Firmware Revision

The Firmware Revision screen list the firmware currently in the controller and the number of controller I/O points. This information may be useful when requesting advice or repair components. This screen also serves a gateway to a "Hidden" screen used to perform certain operations. *(Note: See Hidden Menu Choices near the beginning of this section.)*

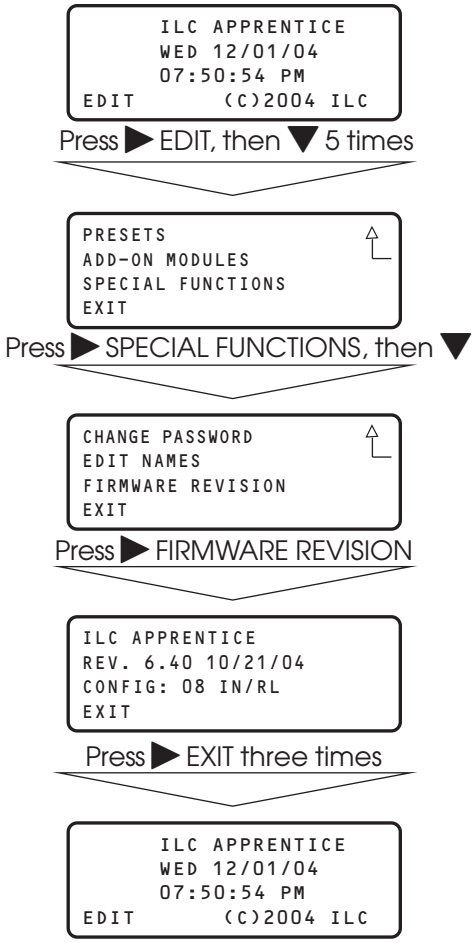
SAMPLE OPERATION:
View The Controller Firmware Revision

1. From the Home screen, press ▶ EDIT; then press ▼ 5 times.

2. When the Main menu appears, press ▶ SPECIAL FUNCTIONS ; then press ▼.

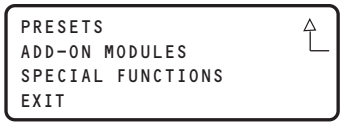
3. When the Special Functions menu appears, press ▶ FIRMWARE REVISION to view the Firmware Revision screen.

4. Press ▶ EXIT three times to return to the Home screen.

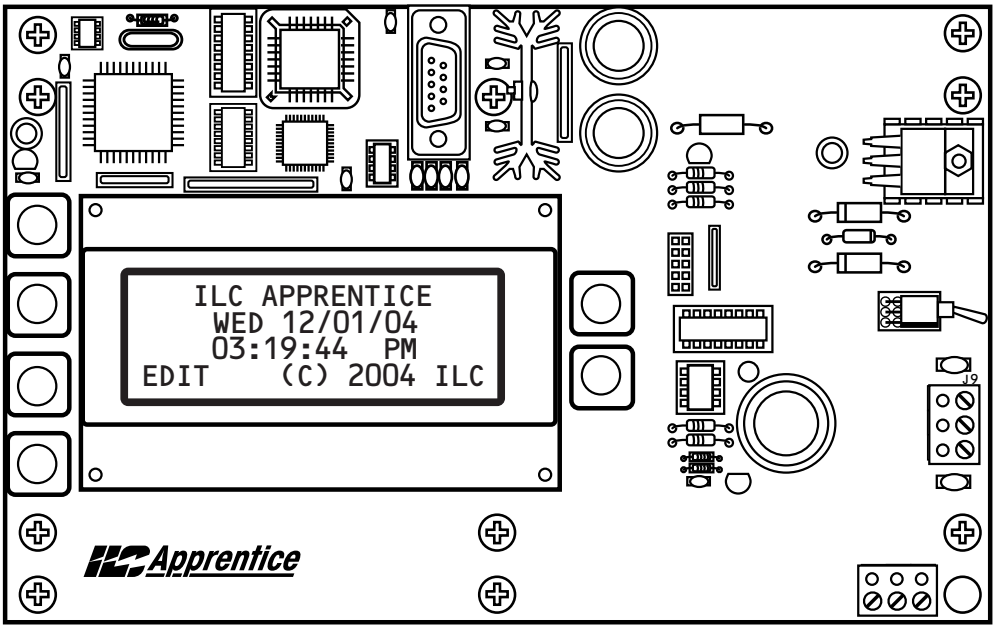


Add-On Modules

ADD-ON MODULES is a choice on the Main menu. It is of interest only if the controller is equipped with optional serial communications and/or telephone interface cards. Details of these options are discussed in the relevant appendix.



Section 4
Appendix



Section 4 Appendix

The FCC requires that the following statement be included in this manual.
FCC Registration #6TP USA-35522-DM-N
Ringer Equivalence 0.4B

Connecting to the telephone company

This equipment complies with Part 68 of the FCC rules. On the back plate near the RJ 11 jack of this equipment is a label that contains, among other information, the FCC registration number and ringer equivalence (REN) for this equipment. If requested, provide this information to your telephone company.

The REN is useful to determine the quantity of devices that may be connected to the telephone line. Excessive RENs on the telephone line may result in devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs of all devices should not exceed five (5). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company.

If your telephone equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance isn't practical, you will be notified as soon as possible. You will be advised of your right to file a complaint with the FCC if you believe it is necessary.

Your telephone company may make changes in your facilities, equipment, operations, or procedures that could affect he operation of your equipment. If they do, you will be given advance notice so as to give you an opportunity to maintain uninterrupted service.

If you experience trouble with this telephone equipment, please contact: Intelligent Lighting Controls, Inc./Reliant Relay Co., Technical Support Department at 1-800-922-8004 for repair and warranty information. If your equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

This equipment may not be used on public coin service provided by the telephone company. Connection to party lines is subject to state tariffs. (Contact your local state public utility commission or corporation commission for information.)

NOTICE: The Industry Canada label identifies certain equipment. This certification means that the equipment meets certain telecommunications network protective, operational and safety requirements. The Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local t elecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line of individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designed by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed 5.

A.1 Overview

The telephone Add-On Module is an optional board that is easily added to the ILC Apprentice controller. This module supports dual-tone multi-frequency (DTMF) touchtone telephone control and monitoring. The module plugs into the expansion port provided on the ILC Apprentice controller CPU board. (See Figure A-2.)

A.2 Voice/DTMF Control Features

This Add-On Module supports the following touchtone telephone control features:

- Get the current status of the controller's relay outputs
- Turn ON or OFF single relays or groups of relays
- Get the current status of the controller's switch inputs
- Activate preset scenes

DTMF commands and control functions are supported by voice prompts that guide you through operational commands and give you instructions on how to use the system.

A.3 Voice/DTMF Control Setup

1. The ILC Apprentice must be equipped with a Voice/DTMF Add-On Module. Locate the card on the controller's processor board. (See Figure A.2.)
2. Connect a phone cord to the module's RJ11 jack and connect the other end to the telephone outlet. **The telephone line must be an analog line and have its own phone number. The line must be direct and not switched through a PBX or any type of extension system.**
3. Dial the telephone number of the controller.
4. When the controller answers, follow the voice prompts that will guide you through the operations you can perform.

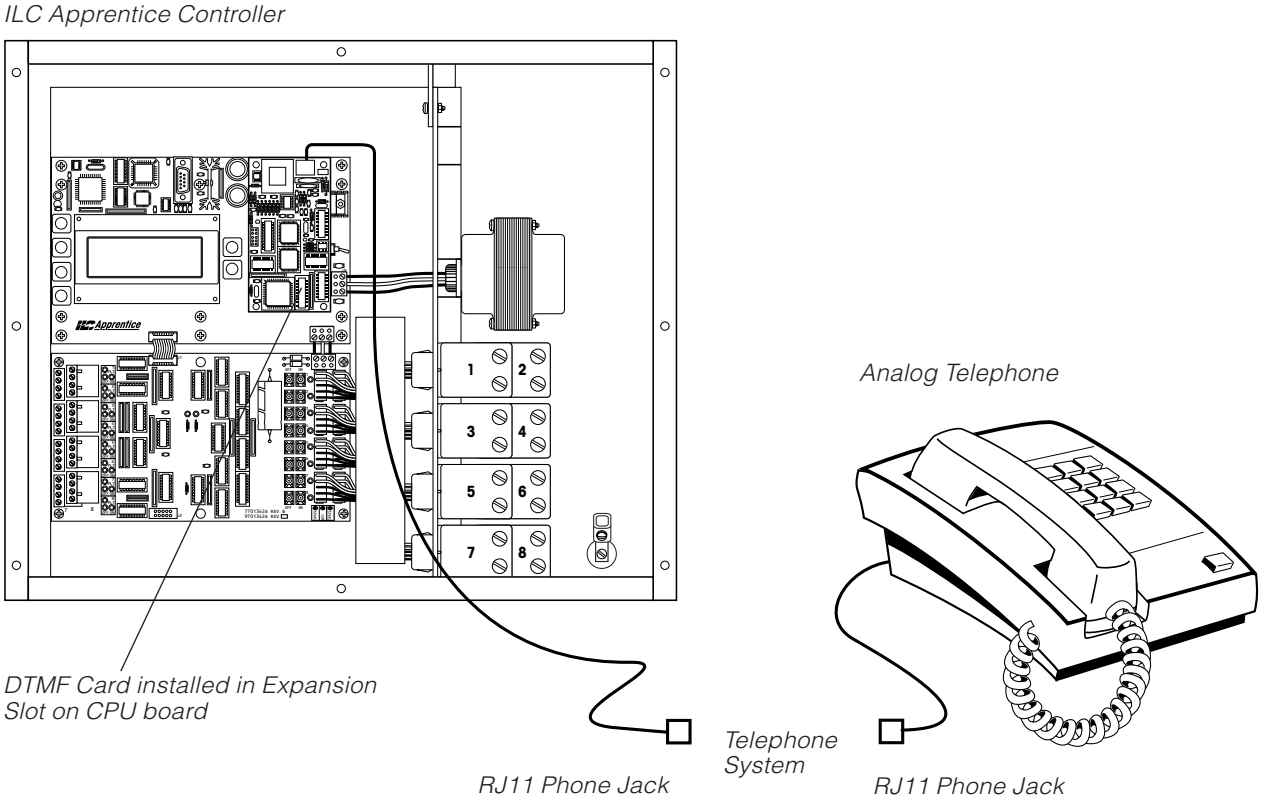


Figure A.1 – DTMF Phone Control

A.4 Voice Prompts for Standalone DTMF Control

When you dial in to the controller you will hear the following voice prompts (prompts in bold):

ILC Elite press 1 (press 1)

(Main Menu)

For relay status and control press 1
(Enter the relay number follwed by the # key or press * to return to the main menu)
For presets press 3
(Enter the preset number follwed by the # key or press * to return to the main menu)
For group control press 4
(Enter the group number follwed by the # key or press * to return to the main menu)
To end this call press #
To repeat this menu press *

(Sub Menus)
(If "1" is pressed on the Main Menu):

Enter the relay number followed by the # key or press * to return to the Main Menu
(Press 01-48 for relays 1-48. The current status of the cosen relay will then be stated.)

Relay __ is ON, to turn OFF Relay __ Press 2. To return to the main menu, press 9

Relay __ is OFF, to turn ON Relay __ Press 1. To return to the main menu, press 9

(If "3" is pressed on the Main Menu):

Enter the preset number followed by the # key
(Press 01-48 for the desired preset)
Preset __ has been activated
(It will then automatically go back to the Main Menu)

(If "4" is pressed on the Main Menu):

Enter the group number followed by the # key
(Press 01-48 for the desired group)
To turn ON Group press 1, to turn OFF Group press 2, to return to the Main Menu press 9.

A.4.1 Control Codes

Use the telephone keypad to enter the following control codes:

- Relay Codes (2 digits)
  Code designates which relay in the panel you want to control (01-48)
  Sample: Enter code 12 to control relay 12
- Preset codes (2 digit)
  (see Page 3-57 for information on how to define a preset)
  01-48
  Sample: Enter code 31 to set Preset 31
- Group codes (2 digit)
  (see Page 3-20 for information on how to define a relay group)
  01-48
  Sample: Enter code 22: you will be prompted to push 1 to turn ON Group 22 or push 2 to turn OFF group 22

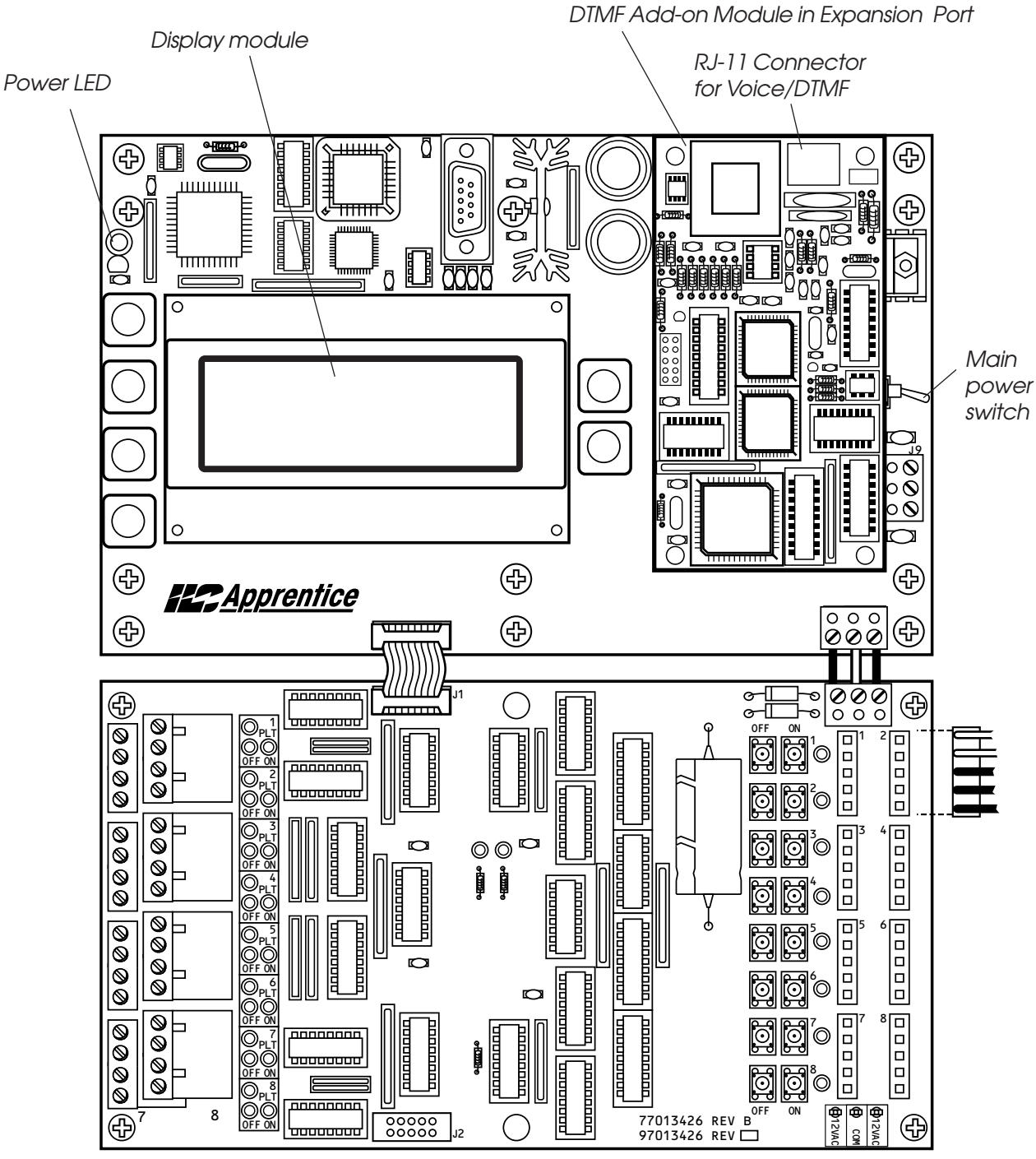


Figure A.2 – Voice/DTMF Module Installation

Overview

C.1 RS232 Programming Control and Monitoring

You can link a personal computer (PC) equipped with a RS232 port and LightMaster Pro software to the ILC Apprentice controller's RS232 port and perform all the control and programming operations supported by LightMaster Pro, including:

- Check the status of the controller's relay outputs and switch inputs
- Turn ON/OFF individual relay outputs
- Sweep ON/OFF all the relay outputs
- Define switch inputs and map them to relay outputs
- Define timers and map them to relay outputs
- Define and invoke preset scenes
- Upload and download data between the controller and your PC.

C.1 RS232 Setup

1. Connect the factory-supplied RS232 cable (part of LightMaster Pro package) to the ILC Apprentice's RS232 port and connect the other end to the COM port you have selected for communication on your computer.
2. Using LightMaster Pro, connect with the controller.
3. When your PC and the controller link, perform the desired LightMaster Pro operations.

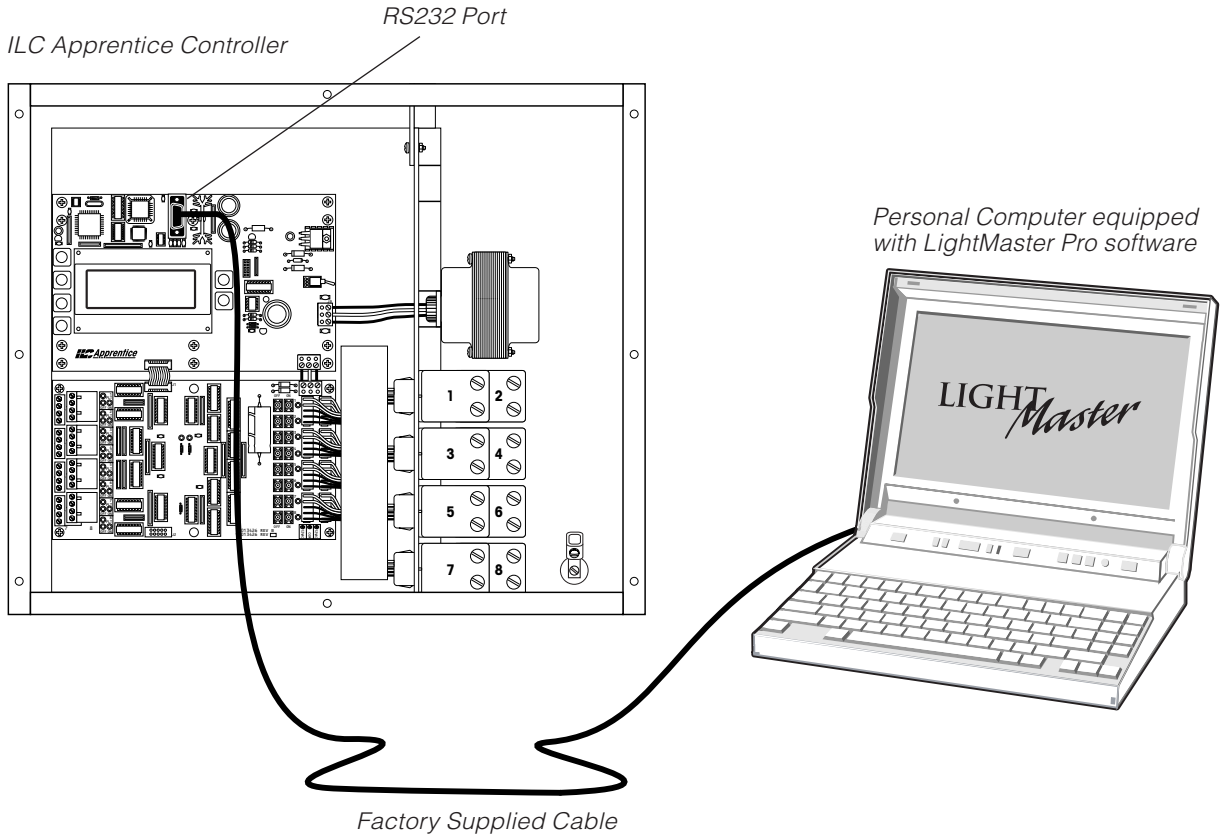


Figure B.1 – Programming the Controller from a PC

E.1 Overview

- With the addition of a DMX 512 interface card, the ILC Apprentice controller supports the control of non-dimmed loads via standard USITT DMX 512 communications protocol.
- The physical link is a standard USITT DMX 512 control cable (18 gauge, shielded twisted pair) that runs from the DMX output of the theatrical lighting controller to the ILC Apprentice DMX communications port. The DMX 512 interface mounts on the ILC Apprentice CPU board. (See Figure D-1.)
- You can program the ILC Apprentice with desired ON and OFF DMX signal levels and then select how the ILC Apprentice relay outputs will respond.
- You set common ON and OFF DMX signal levels for all DMX 512 channels (1 to 512 channels). However, you can program relay action on an individual channel basis.

DMX ON and DMX OFF Levels:
Any time a DMX channel is at or above the ON level, the relay(s) mapped to that channel will be forced ON regardless of any switch input or timer control. Any time a DMX channel is at or below the OFF level, the relay(s) mapped to that channel will be forced OFF regardless of any switch input or timer control. While a DMX channel is below the ON level and above the OFF level, the relay(s) mapped to that channel are able to be controlled by switch inputs and timers.

EXAMPLE 1: To lock out all control other than DMX, set the DMX ON level to 90% and the OFF level to 10%. By setting the DMX signal level to 100% or 0%, the relay(s) will turn ON or OFF and also revert to the desired position after any change due to a switch input or timer.

EXAMPLE 2: To control relays via DMX and also allow switch inputs or timers to change the position, set the DMX ON level to 90% and the OFF level to 10%. By momentarily setting the DMX signal level to 100% and then setting it to 50%, the relay(s) will be turned ON and local control will return. By momentarily setting the DMX signal level to 0% and then setting it to 50%, the relay(s) will be turned OFF and local control will return.

DMX Filter:
The Filter setting determines the number of times the ILC Apprentice must receive a constant value on a DMX channel prior to performing the control mapped to that channel. The Filter may be set from 1 to 16. Lower Filter settings make the ILC Apprentice respond faster to DMX commands. Higher Filter settings prevent undesired relay control due to momentary zero levels on DMX channels. The Filter setting does not directly correspond to DMX frame counts due to the ILC Apprentice not reading each frame.

E.2 Objectives

After reading Appendix D, you will be able to program the ILC Apprentice to implement DMX control.

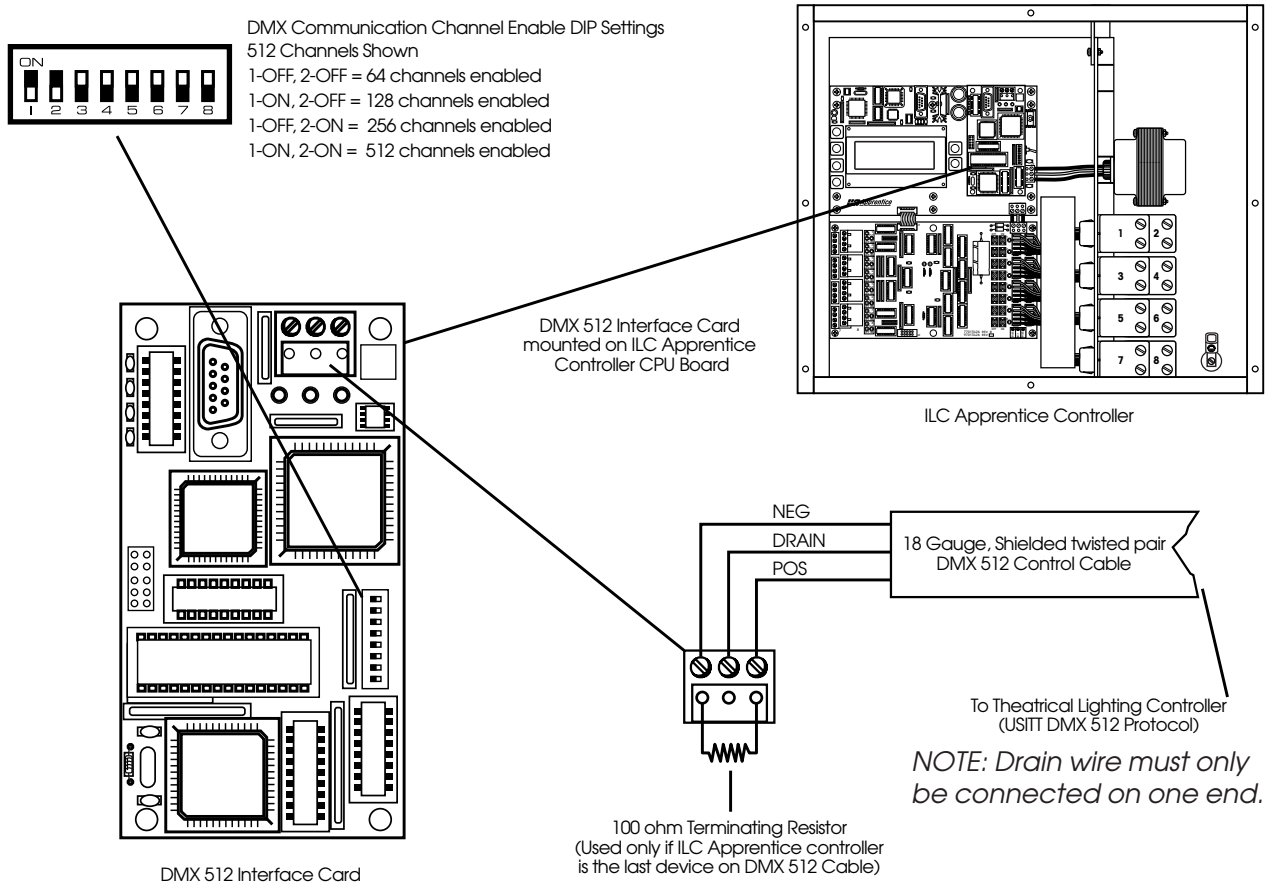
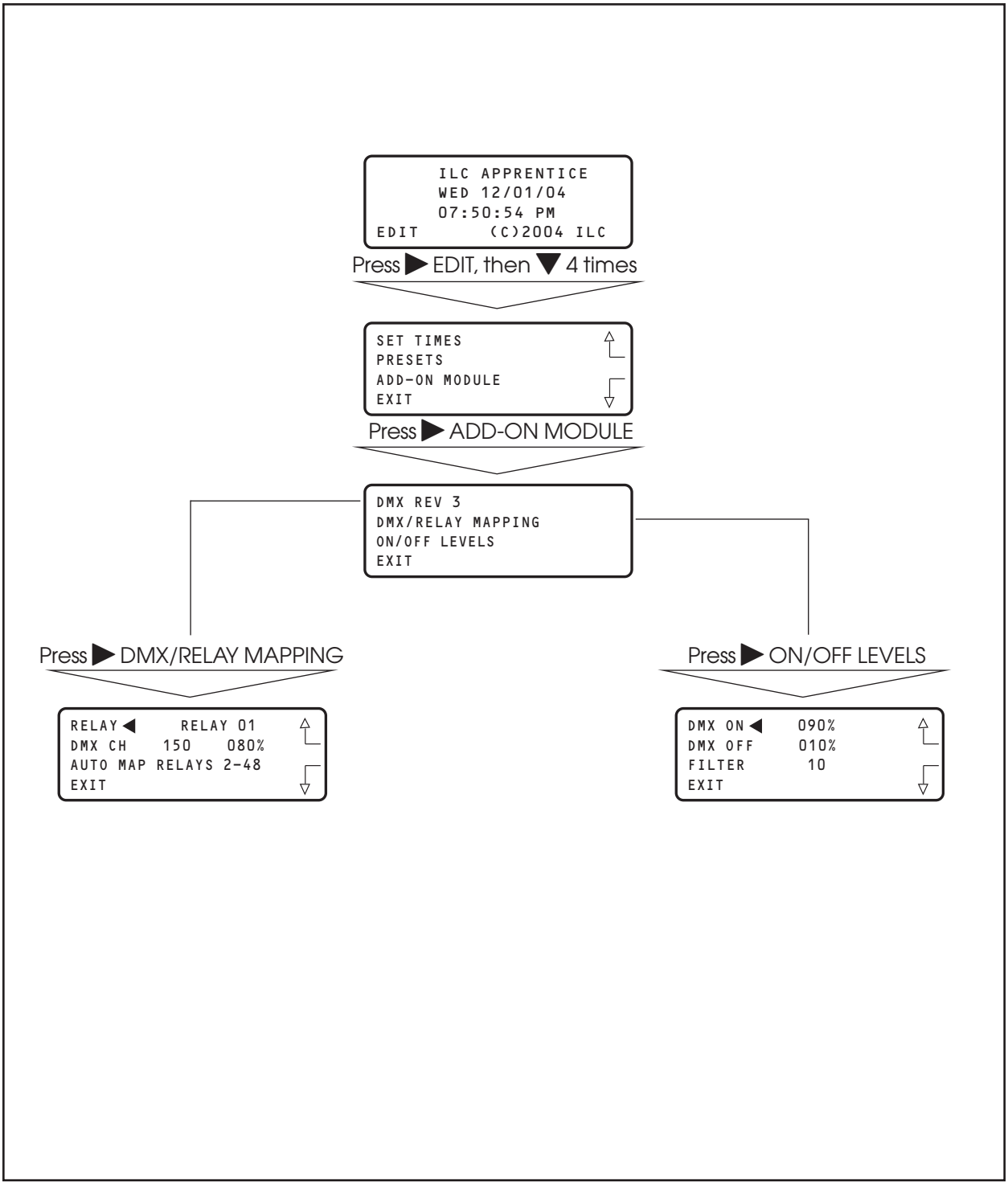


Figure D.1 – DMX Interface Hardware Features

DMX Control – Fast Track



E.3 Programming Example

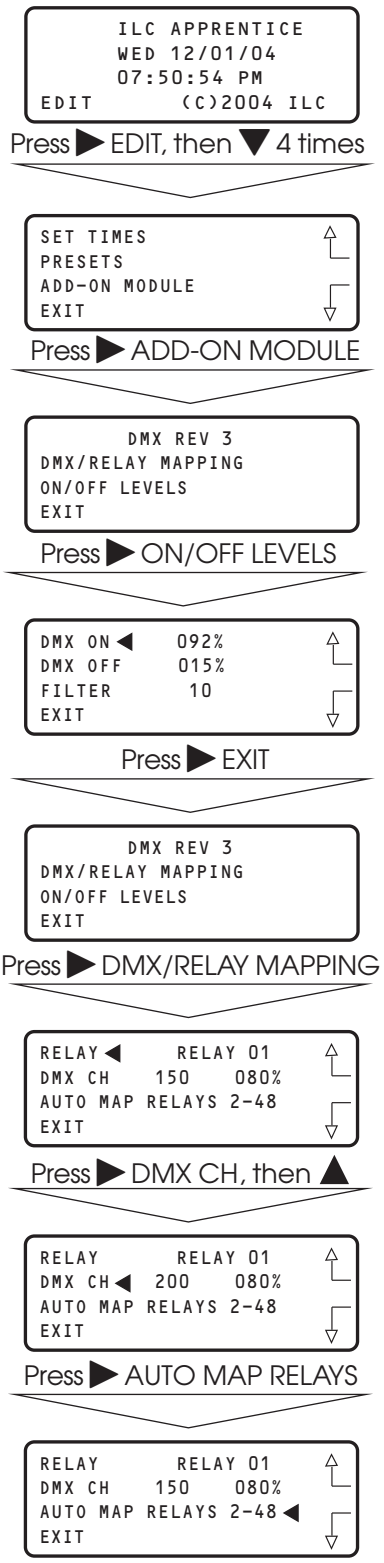
Set the DMX signal ON level at 92% and the OFF level at 15%. Program relay output 1 to respond by switching ON at 92% and OFF at 15% on channel 200. (The default values are 90% and 10%, respectively.)

NOTE: If programming relays 1-48 you can enter the relay channel for relay 01 – then press Auto Map Relays 2-48, and the controller will automatically assign relays 2-48 to the channels in ascending order.

Example: If you program Relay 01 to channel 200, relay 2 will be assigned to channel 201, relay 3 to channel 202, and so on in ascending order.

Note also that the DMX/Relay Control screen displays the current level.

1. From the Home screen, press ▶ EDIT; then press ▼ 4 times to access the ADD-ON MODULE screen.
2. Press ▶ ADD-ON MODULE.
3. Press ▶ ON/OFF LEVELS.
4. When the Level screen appears, press ▲ or ▼ until 92% appears in the ON field.
5. Press ▶ DMX OFF, then ▲ or ▼ until 15% appears in the OFF field.
6. Press ▶ FILTER, then ▲ or ▼ to select a filter value.
7. Press ▶ EXIT to return to the DMX menu.
8. Press ▶ DMX/RELAY MAPPING.
9. Press ▶ DMX CH; then press ▲ or ▼ until channel 200 appears.
10. If you want to Auto program the rest of the channels, press ▶ AUTO MAP RELAYS 2-48.
11. Press ▶ EXIT 3 times to return to the Home screen.



M.1 Overview

MODBUS protocol is an industrial communications and distributive control system developed by Gould-Modicon to integrate programmable logic controllers (PLCs), computers, terminals and other monitoring, sensing, and control devices. With the addition of a ILC MODBUS Add-On Module, and setting a unique address via the mudule's address DIP switches, the ILC Apprentice lighting controller can become a Slave NODE on the MODBUS Network. (See Figure M-1.)

M.2 Structure

MODBUS is a Master/Slave communications protocol. One device (the Master) controls all serial activity by selectively polling one or more of the slave devices. The maximum number of slave devices is 247 per network. Each device (node) is assigned a unique address to distinguish it from all the other nodes.

Only the Master initiates a transaction. Transactions are either a query/response (only a single slave is addressed), or a broadcast/no response (all slaves are addressed). A transaction comprises a single query and single response frame or a single broadcast frame.

Certain characteristics of the MODBUS protocol are fixed: frame format, frame sequences, communications error handling, exception conditions, and the functions performed. Other characteristics are selectable: transmission media, baud rate, character parity, number of stop bits, communications error handling, exception conditions, and functions performed.

M.3 Transmission Modes

The transmission mode is the structure of the individual units of information within a message, and the numbering system used to transmit the data. Two transmission modes are available. Both provide the same communication capabilities. The mode slected depends on the equipment used as the MODBUS master. Only one transmission mode may be selected per network. Mixing modes on a single network is not allowed. The two available tranbsmission modes are ASCII (American Standard Code For Information Interchange) and RTU (Remote Terminal Unit)

M.3.1 ASCII

Coding System – ASCII (7 Bit); hexadecimal uses ASCII printable characters (0-9, A-F)
Start Bits – 1
Data Bits (least significant first) – 7
Parity (optional) – 1 (1 Bit set for even or odd, no Bits for no parity)
Stop Bits – 1 or 2
Error Checking – LRC (Longitudinal Redundancy Check)

M.3.2 RTU

Coding System – 8 Bit Binary
Start Bits – 1
Data Bits (least significant first) – 8
Parity (optional) – 1 (1 Bit set for even or odd, no Bits for no parity)
Stop Bits – 1 or 2
Error Checking – CRC (Cyclical Redundancy Check)

ILC Apprentice MODBUS Communications Example – See Termination Detail Below

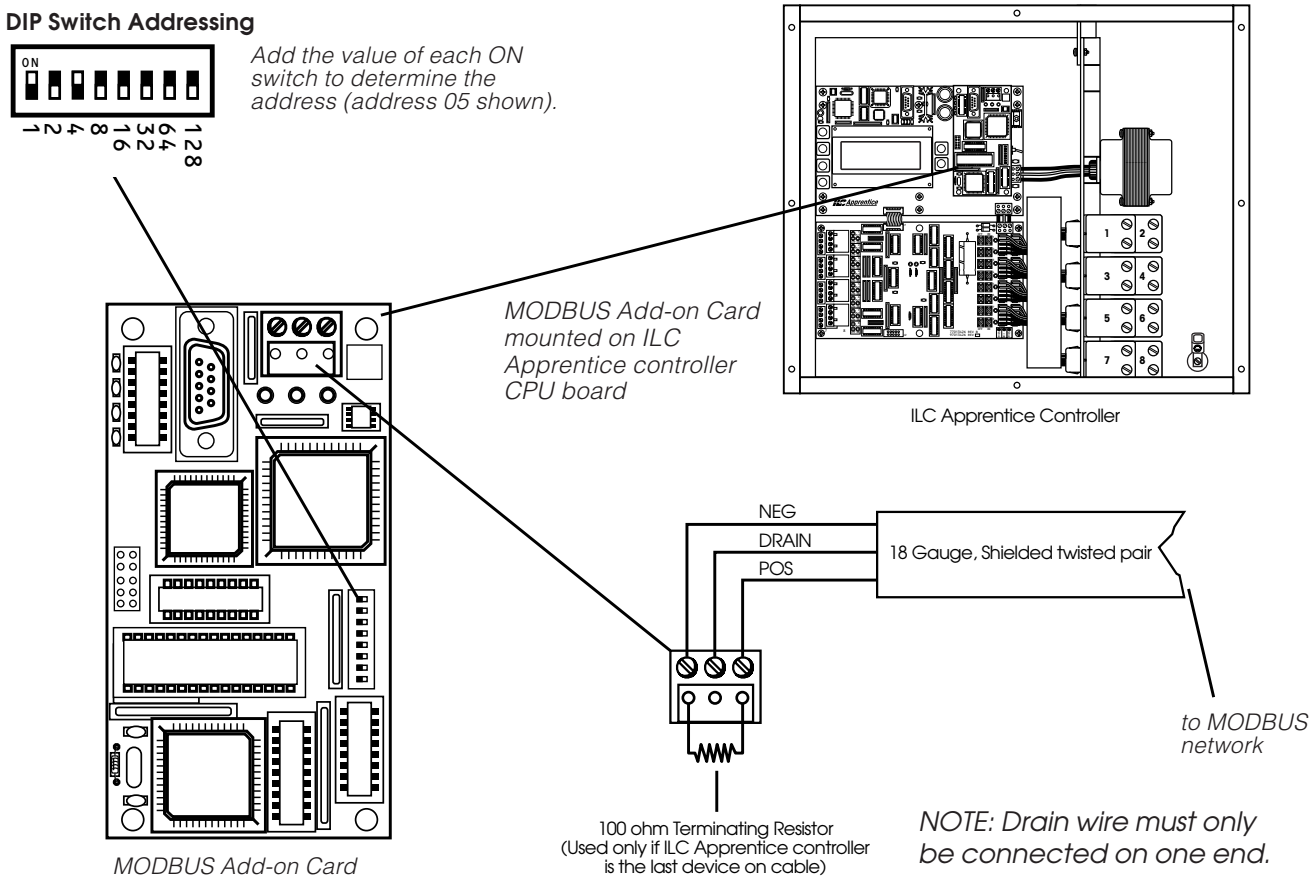


Figure M-1 MODBUS Set-Up

M.4 Transmission Mode Characteristics

ASCII printable characters are easy to view when trouble shooting and this mode is suited to PLC masters and computer masters programmed in a high level language, such as VISCOM BASIC.

In RTU mode, data is sent in 8-bit binary characters. In ASCII mode, data is divided into two 4 bit parts and then represented by the hexadecimal equivalent. ASCII mode uses twice as many characters as RTU mode but decoding is easier.

In RTU mode data must be transmitted in a continuous stream. In ASCII mode breaks of up to one second can occur between characters to allow for a relatively slow master.

M.5 Hardware Setup

The ILC Apprentice must be equipped with a MODBUS add-on card and addressed with a unique node address (See Figure M-1). The network cable is a two wire shielded twisted pair. Consult the Automation system provider for the exact specifications. Terminate the cable as shown in Figure M.1.

M.6 Required Parameter Entries

After setting the MODBUS card address DIP switches, you must power up the ILC Apprentice controller and define certain operational parameters for MODBUS communication. (See Fast Track diagram on next page.)

M.7 Framing

Both ASCII and RTU transmission modes feature mechanisms to indicate the beginning and end of a frame, the node address, a function code (the type of information sought/command signal), a data field indicating the particular point or register accessed. See Table M-1 for data field I/O point designators for a ILC Apprentice node.

M.8 Supported Commands

01 Read coil status
02 Read input status
05 Force singe coil
15 Force multiple coils
For more information refer to Modicon Modbus Protocol Reference Guide (PI-MBUS-300)

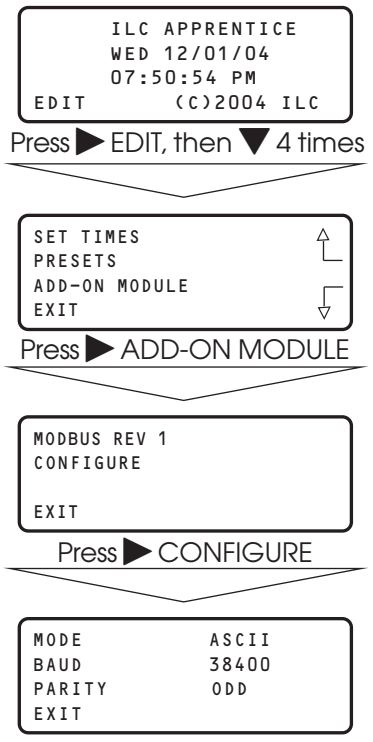
M.9 Additional Functions

- On/OFF with Time options (Blink/Alarm) See Table M.1.2
- Input Enable/Disable. See Table M.1.3

M.10 Additional Information

Contact Modicon Inc. if you would like more detailed information on MODBUS protocol.

MODBUS – Fast Track



MODE options: *RTU, ASCII*

BAUD options: *4800, 9600, 19200, 38400*

PARITY options: *ODD, EVEN, NONE*

MODBUS Screen Flow

ILC Apprentice Input	ON	OFF	Closed	Open
1	1	49	1 = Input Closed	0= Input Open
2	2	50	1 = Input Closed	0= Input Open
3	3	51	1 = Input Closed	0= Input Open
4	4	52	1 = Input Closed	0= Input Open
5	5	53	1 = Input Closed	0= Input Open
6	6	54	1 = Input Closed	0= Input Open
7	7	55	1 = Input Closed	0= Input Open
8	8	56	1 = Input Closed	0= Input Open
9	9	57	1 = Input Closed	0= Input Open
10	10	58	1 = Input Closed	0= Input Open
11	11	59	1 = Input Closed	0= Input Open
12	12	60	1 = Input Closed	0= Input Open
13	13	61	1 = Input Closed	0= Input Open
14	14	62	1 = Input Closed	0= Input Open
15	15	63	1 = Input Closed	0= Input Open
16	16	64	1 = Input Closed	0= Input Open
17	17	65	1 = Input Closed	0= Input Open
18	18	66	1 = Input Closed	0= Input Open
19	19	67	1 = Input Closed	0= Input Open
20	20	68	1 = Input Closed	0= Input Open
21	21	69	1 = Input Closed	0= Input Open
22	22	70	1 = Input Closed	0= Input Open
23	23	71	1 = Input Closed	0= Input Open
24	24	72	1 = Input Closed	0= Input Open
25	25	73	1 = Input Closed	0= Input Open
26	26	74	1 = Input Closed	0= Input Open
27	27	75	1 = Input Closed	0= Input Open
28	28	76	1 = Input Closed	0= Input Open
29	29	77	1 = Input Closed	0= Input Open
30	30	78	1 = Input Closed	0= Input Open
31	31	79	1 = Input Closed	0= Input Open
32	32	80	1 = Input Closed	0= Input Open
33	33	81	1 = Input Closed	0= Input Open
34	34	82	1 = Input Closed	0= Input Open
35	35	83	1 = Input Closed	0= Input Open
36	36	84	1 = Input Closed	0= Input Open
37	37	85	1 = Input Closed	0= Input Open
38	38	86	1 = Input Closed	0= Input Open
39	39	87	1 = Input Closed	0= Input Open
40	40	88	1 = Input Closed	0= Input Open
41	41	89	1 = Input Closed	0= Input Open
42	42	90	1 = Input Closed	0= Input Open
43	43	91	1 = Input Closed	0= Input Open
44	44	92	1 = Input Closed	0= Input Open
45	45	93	1 = Input Closed	0= Input Open
46	46	94	1 = Input Closed	0= Input Open
47	47	95	1 = Input Closed	0= Input Open
48	48	96	1 = Input Closed	0= Input Open

Table M.1 – ILC Apprentice Data Field Input Point Designators

ILC Apprentice Output	Closed	Open
1	1=Output Closed	0=Output Open
2	1=Output Closed	0=Output Open
3	1=Output Closed	0=Output Open
4	1=Output Closed	0=Output Open
5	1=Output Closed	0=Output Open
6	1=Output Closed	0=Output Open
7	1=Output Closed	0=Output Open
8	1=Output Closed	0=Output Open
9	1=Output Closed	0=Output Open
10	1=Output Closed	0=Output Open
11	1=Output Closed	0=Output Open
12	1=Output Closed	0=Output Open
13	1=Output Closed	0=Output Open
14	1=Output Closed	0=Output Open
15	1=Output Closed	0=Output Open
16	1=Output Closed	0=Output Open
17	1=Output Closed	0=Output Open
18	1=Output Closed	0=Output Open
19	1=Output Closed	0=Output Open
20	1=Output Closed	0=Output Open
21	1=Output Closed	0=Output Open
22	1=Output Closed	0=Output Open
23	1=Output Closed	0=Output Open
24	1=Output Closed	0=Output Open
25	1=Output Closed	0=Output Open
26	1=Output Closed	0=Output Open
27	1=Output Closed	0=Output Open
28	1=Output Closed	0=Output Open
29	1=Output Closed	0=Output Open
30	1=Output Closed	0=Output Open
31	1=Output Closed	0=Output Open
32	1=Output Closed	0=Output Open
33	1=Output Closed	0=Output Open
34	1=Output Closed	0=Output Open
35	1=Output Closed	0=Output Open
36	1=Output Closed	0=Output Open
37	1=Output Closed	0=Output Open
38	1=Output Closed	0=Output Open
39	1=Output Closed	0=Output Open
40	1=Output Closed	0=Output Open
41	1=Output Closed	0=Output Open
42	1=Output Closed	0=Output Open
43	1=Output Closed	0=Output Open
44	1=Output Closed	0=Output Open
45	1=Output Closed	0=Output Open
46	1=Output Closed	0=Output Open
47	1=Output Closed	0=Output Open
48	1=Output Closed	0=Output Open

Table M.1.1 – ILC Apprentice Data Field Output Point Designators

ILC Apprentice Output	Coil Point	Closed	Open
1	101	1=Output Closed/Timer Option	0=Output Open/Timer Option
2	102	1=Output Closed/Timer Option	0=Output Open/Timer Option
3	103	1=Output Closed/Timer Option	0=Output Open/Timer Option
4	104	1=Output Closed/Timer Option	0=Output Open/Timer Option
5	105	1=Output Closed/Timer Option	0=Output Open/Timer Option
6	106	1=Output Closed/Timer Option	0=Output Open/Timer Option
7	107	1=Output Closed/Timer Option	0=Output Open/Timer Option
8	108	1=Output Closed/Timer Option	0=Output Open/Timer Option
9	109	1=Output Closed/Timer Option	0=Output Open/Timer Option
10	110	1=Output Closed/Timer Option	0=Output Open/Timer Option
11	111	1=Output Closed/Timer Option	0=Output Open/Timer Option
12	112	1=Output Closed/Timer Option	0=Output Open/Timer Option
13	113	1=Output Closed/Timer Option	0=Output Open/Timer Option
14	114	1=Output Closed/Timer Option	0=Output Open/Timer Option
15	115	1=Output Closed/Timer Option	0=Output Open/Timer Option
16	116	1=Output Closed/Timer Option	0=Output Open/Timer Option
17	117	1=Output Closed/Timer Option	0=Output Open/Timer Option
18	118	1=Output Closed/Timer Option	0=Output Open/Timer Option
19	119	1=Output Closed/Timer Option	0=Output Open/Timer Option
20	120	1=Output Closed/Timer Option	0=Output Open/Timer Option
21	121	1=Output Closed/Timer Option	0=Output Open/Timer Option
22	122	1=Output Closed/Timer Option	0=Output Open/Timer Option
23	123	1=Output Closed/Timer Option	0=Output Open/Timer Option
24	124	1=Output Closed/Timer Option	0=Output Open/Timer Option
25	125	1=Output Closed/Timer Option	0=Output Open/Timer Option
26	126	1=Output Closed/Timer Option	0=Output Open/Timer Option
27	127	1=Output Closed/Timer Option	0=Output Open/Timer Option
28	128	1=Output Closed/Timer Option	0=Output Open/Timer Option
29	129	1=Output Closed/Timer Option	0=Output Open/Timer Option
30	130	1=Output Closed/Timer Option	0=Output Open/Timer Option
31	131	1=Output Closed/Timer Option	0=Output Open/Timer Option
32	132	1=Output Closed/Timer Option	0=Output Open/Timer Option
33	133	1=Output Closed/Timer Option	0=Output Open/Timer Option
34	134	1=Output Closed/Timer Option	0=Output Open/Timer Option
35	135	1=Output Closed/Timer Option	0=Output Open/Timer Option
36	136	1=Output Closed/Timer Option	0=Output Open/Timer Option
37	137	1=Output Closed/Timer Option	0=Output Open/Timer Option
38	138	1=Output Closed/Timer Option	0=Output Open/Timer Option
30	139	1=Output Closed/Timer Option	0=Output Open/Timer Option
40	140	1=Output Closed/Timer Option	0=Output Open/Timer Option
41	141	1=Output Closed/Timer Option	0=Output Open/Timer Option
42	142	1=Output Closed/Timer Option	0=Output Open/Timer Option
43	143	1=Output Closed/Timer Option	0=Output Open/Timer Option
44	144	1=Output Closed/Timer Option	0=Output Open/Timer Option
45	145	1=Output Closed/Timer Option	0=Output Open/Timer Option
46	146	1=Output Closed/Timer Option	0=Output Open/Timer Option
47	147	1=Output Closed/Timer Option	0=Output Open/Timer Option
48	148	1=Output Closed/Timer Option	0=Output Open/Timer Option

Table M.1.2 – ILC Apprentice with a Timer Option (Blink/Alarm) Output Point Designators

ILC Apprentice Intput		Coil Point	Closed Open
1	201	1=Input Disable	0=Input Enable
2	202	1=Input Disable	0=Input Enable
3	203	1=Input Disable	0=Input Enable
4	204	1=Input Disable	0=Input Enable
5	205	1=Input Disable	0=Input Enable
6	206	1=Input Disable	0=Input Enable
7	207	1=Input Disable	0=Input Enable
8	208	1=Input Disable	0=Input Enable
9	209	1=Input Disable	0=Input Enable
10	210	1=Input Disable	0=Input Enable
11	211	1=Input Disable	0=Input Enable
12	212	1=Input Disable	0=Input Enable
13	213	1=Input Disable	0=Input Enable
14	214	1=Input Disable	0=Input Enable
15	215	1=Input Disable	0=Input Enable
16	216	1=Input Disable	0=Input Enable
17	217	1=Input Disable	0=Input Enable
18	218	1=Input Disable	0=Input Enable
19	219	1=Input Disable	0=Input Enable
20	220	1=Input Disable	0=Input Enable
21	221	1=Input Disable	0=Input Enable
22	222	1=Input Disable	0=Input Enable
23	223	1=Input Disable	0=Input Enable
24	224	1=Input Disable	0=Input Enable
25	225	1=Input Disable	0=Input Enable
26	226	1=Input Disable	0=Input Enable
27	227	1=Input Disable	0=Input Enable
28	228	1=Input Disable	0=Input Enable
29	229	1=Input Disable	0=Input Enable
30	230	1=Input Disable	0=Input Enable
31	231	1=Input Disable	0=Input Enable
32	232	1=Input Disable	0=Input Enable
33	233	1=Input Disable	0=Input Enable
34	234	1=Input Disable	0=Input Enable
35	235	1=Input Disable	0=Input Enable
36	236	1=Input Disable	0=Input Enable
37	237	1=Input Disable	0=Input Enable
38	238	1=Input Disable	0=Input Enable
30	239	1=Input Disable	0=Input Enable
40	240	1=Input Disable	0=Input Enable
41	241	1=Input Disable	0=Input Enable
42	242	1=Input Disable	0=Input Enable
43	243	1=Input Disable	0=Input Enable
44	244	1=Input Disable	0=Input Enable
45	245	1=Input Disable	0=Input Enable
46	246	1=Input Disable	0=Input Enable
47	247	1=Input Disable	0=Input Enable
48	248	1=Input Disable	0=Input Enable

Table M.1.3 – ILC Apprentice Input Enable/Disable Point Designators

N.1 Overview

The ILC Apprentice controller can be integrated into a Building Automation System (BAS) that uses the N2 communications protocol. The host system can then poll the status of the ILC Apprentice controller inputs and outputs and issue ON/OFF commands to the ILC Apprentice's relay outputs.

N.2 Hardware Setup

The ILC Apprentice must be equipped with a N2 add-on module that is addressed with a unique node address. (See Figure N-1.) The network cable is a two wire shielded twisted pair. Consult the BAS system documentation for the exact specifications. Terminate the cable as shown in Figure N-1.

N.3 Point Map

Fill out the point map for the ILC Apprentice controller. Note that only BI and BO point types are used. The completed point map will serve as the control schedule used to determine how ILC Apprentice relay outputs will be controlled.

ILC LightMaster N2 Rev 1 Unsupported Attributes

All attributes in the following regions

Analog Input
Analog Output
Internal Float
Internal Integer
Internal Byte

Binary Input Unsupported Attributes

Attribute 1		
Bit 0	COS _enabled	Always 1 (COS is always enabled)
Bit 1	Normal state	Always 0
Bit 3	Alarm_enabled	Always 0 (disabled)
Attribute 2		
Bit 0	Always reliable (0)	
Bit 1	Override active	Always 0 (not active)
Bit 4	Normal (0)	
Bit 5	JCI use only	
Attribute 3	JCI use only	
Attribute 4	JCI use only	

Binary Output Unsupported Attributes

Attribute 1		
Bit 0	COS _enabled	Always 0 (COS is always enabled)
Bit 1	Normal state	Always 0
Attribute 2		
Bit 0	Always reliable (0)	
Bit 1	Override active	Always 0 (not active)
Bit 4	JCI use only	
Bit 5	JCI use only	
Attribute 3	Minimum ON time	Always 0
Attribute 4	Minimum OFF time	Always 0
Attribute 5	Maximum Cycles/Hour	Always 0
Attribute 6	JCI use only	
Attribute 7	JCI use only	

ILC Apprentice N2 Network Example – See Termination Detail Below

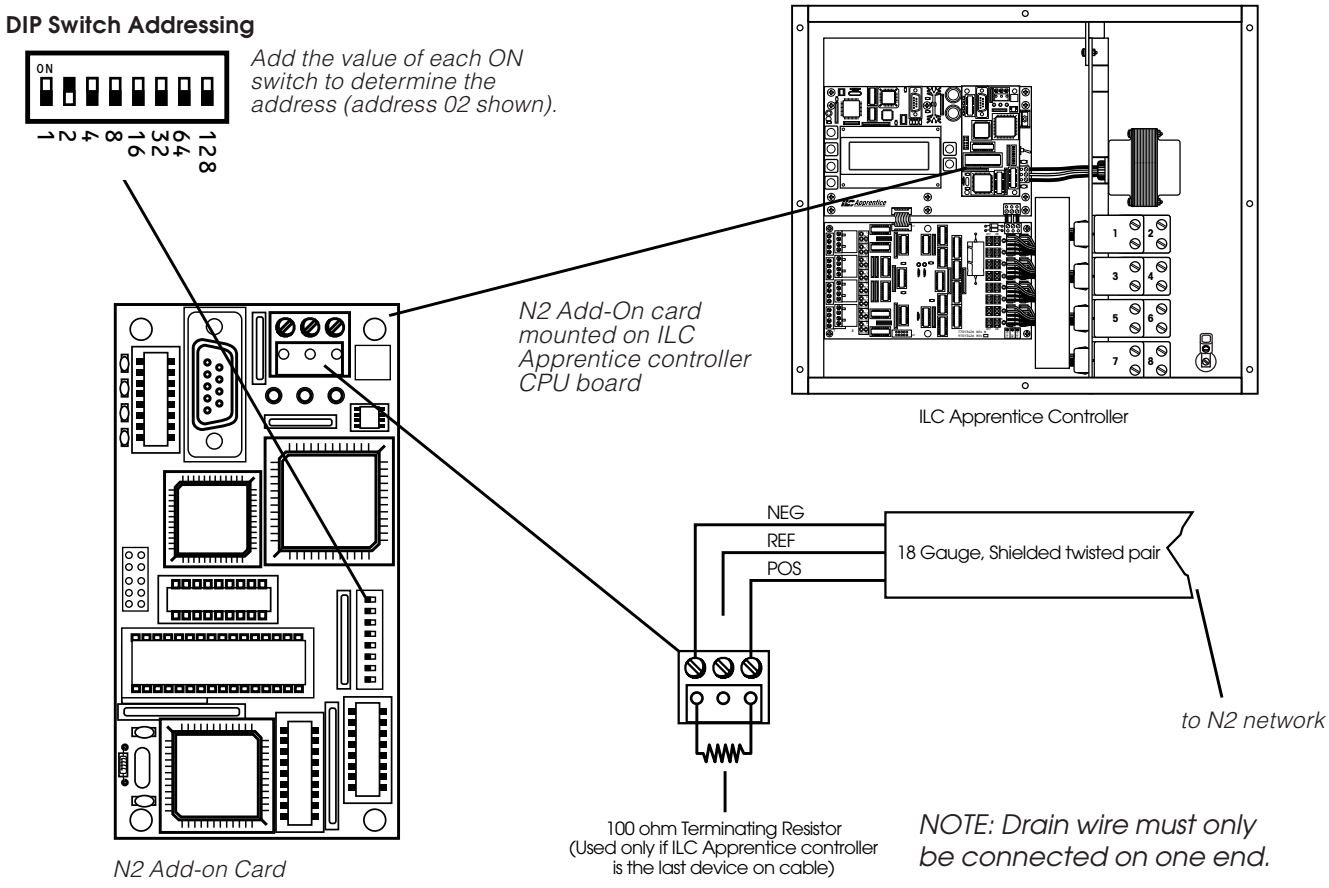
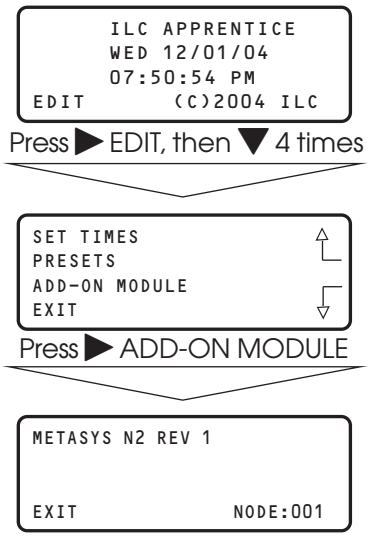


Figure N-1 N2 Set-Up

N2 – Fast Track



N2
Screen Flow

NETWORK POINT TYPE	NETWORK POINT ADDRESS	UNITS	POINT DESCRIPTION	RANGE/VALUE	NOTES
BI	1		SWITCH INPUT #1 OFF	0-OPEN 1-CLOSED	
BI	2		SWITCH INPUT #1 ON	0-OPEN 1-CLOSED	
BI	3		SWITCH INPUT #2 OFF	0-OPEN 1-CLOSED	
BI	4		SWITCH INPUT #2 ON	0-OPEN 1-CLOSED	
BI	5		SWITCH INPUT #3 OFF	0-OPEN 1-CLOSED	
BI	6		SWITCH INPUT #3 ON	0-OPEN 1-CLOSED	
BI	7		SWITCH INPUT #4 OFF	0-OPEN 1-CLOSED	
BI	8		SWITCH INPUT #4 ON	0-OPEN 1-CLOSED	
BI	9		SWITCH INPUT #5 OFF	0-OPEN 1-CLOSED	
BI	10		SWITCH INPUT #5 ON	0-OPEN 1-CLOSED	
BI	11		SWITCH INPUT #6 OFF	0-OPEN 1-CLOSED	
BI	12		SWITCH INPUT #6 ON	0-OPEN 1-CLOSED	
BI	13		SWITCH INPUT #7 OFF	0-OPEN 1-CLOSED	
BI	14		SWITCH INPUT #7 ON	0-OPEN 1-CLOSED	
BI	15		SWITCH INPUT #8 OFF	0-OPEN 1-CLOSED	
BI	16		SWITCH INPUT #8 ON	0-OPEN 1-CLOSED	
BI	17		SWITCH INPUT #9 OFF	0-OPEN 1-CLOSED	
BI	18		SWITCH INPUT #9 ON	0-OPEN 1-CLOSED	
BI	19		SWITCH INPUT #10 OFF	0-OPEN 1-CLOSED	
BI	20		SWITCH INPUT #10 ON	0-OPEN 1-CLOSED	
BI	21		SWITCH INPUT #11 OFF	0-OPEN 1-CLOSED	
BI	22		SWITCH INPUT #11 ON	0-OPEN 1-CLOSED	
BI	23		SWITCH INPUT #12 OFF	0-OPEN 1-CLOSED	
BI	24		SWITCH INPUT #12 ON	0-OPEN 1-CLOSED	

Table N.1 – ILC Apprentice Input N2 Point Map

NETWORK POINT TYPE	NETWORK POINT ADDRESS	UNITS	POINT DESCRIPTION	RANGE/VALUE	NOTES
BI	25		SWITCH INPUT #13 OFF	0-OPEN 1-CLOSED	
BI	26		SWITCH INPUT #13 ON	0-OPEN 1-CLOSED	
BI	27		SWITCH INPUT #14 OFF	0-OPEN 1-CLOSED	
BI	28		SWITCH INPUT #14 ON	0-OPEN 1-CLOSED	
BI	29		SWITCH INPUT #15 OFF	0-OPEN 1-CLOSED	
BI	30		SWITCH INPUT #15 ON	0-OPEN 1-CLOSED	
BI	31		SWITCH INPUT #16 OFF	0-OPEN 1-CLOSED	
BI	32		SWITCH INPUT #16 ON	0-OPEN 1-CLOSED	
BI	33		SWITCH INPUT #17 OFF	0-OPEN 1-CLOSED	
BI	34		SWITCH INPUT #17 ON	0-OPEN 1-CLOSED	
BI	35		SWITCH INPUT #18 OFF	0-OPEN 1-CLOSED	
BI	36		SWITCH INPUT #18 ON	0-OPEN 1-CLOSED	
BI	37		SWITCH INPUT #19 OFF	0-OPEN 1-CLOSED	
BI	38		SWITCH INPUT #19 ON	0-OPEN 1-CLOSED	
BI	39		SWITCH INPUT #20 OFF	0-OPEN 1-CLOSED	
BI	40		SWITCH INPUT #20 ON	0-OPEN 1-CLOSED	
BI	41		SWITCH INPUT #21 OFF	0-OPEN 1-CLOSED	
BI	42		SWITCH INPUT #21 ON	0-OPEN 1-CLOSED	
BI	43		SWITCH INPUT #22 OFF	0-OPEN 1-CLOSED	
BI	44		SWITCH INPUT #22 ON	0-OPEN 1-CLOSED	
BI	45		SWITCH INPUT #23 OFF	0-OPEN 1-CLOSED	
BI	46		SWITCH INPUT #23 ON	0-OPEN 1-CLOSED	
BI	47		SWITCH INPUT #24 OFF	0-OPEN 1-CLOSED	
BI	48		SWITCH INPUT #24 ON	0-OPEN 1-CLOSED	
BI	49		SWITCH INPUT #25 OFF	0-OPEN 1-CLOSED	

Table N.1 – ILC Apprentice Input N2 Point Map

NETWORK POINT TYPE	NETWORK POINT ADDRESS	UNITS	POINT DESCRIPTION	RANGE/VALUE	NOTES
BI	50		SWITCH INPUT #25 ON	0-OPEN 1-CLOSED	
BI	51		SWITCH INPUT #26 OFF	0-OPEN 1-CLOSED	
BI	52		SWITCH INPUT #26 ON	0-OPEN 1-CLOSED	
BI	53		SWITCH INPUT #27 OFF	0-OPEN 1-CLOSED	
BI	54		SWITCH INPUT #27 ON	0-OPEN 1-CLOSED	
BI	55		SWITCH INPUT #28 OFF	0-OPEN 1-CLOSED	
BI	56		SWITCH INPUT #28 ON	0-OPEN 1-CLOSED	
BI	57		SWITCH INPUT #29 OFF	0-OPEN 1-CLOSED	
BI	58		SWITCH INPUT #29 ON	0-OPEN 1-CLOSED	
BI	59		SWITCH INPUT #30 OFF	0-OPEN 1-CLOSED	
BI	60		SWITCH INPUT #30 ON	0-OPEN 1-CLOSED	
BI	61		SWITCH INPUT #31 OFF	0-OPEN 1-CLOSED	
BI	62		SWITCH INPUT #31 ON	0-OPEN 1-CLOSED	
BI	63		SWITCH INPUT #32 OFF	0-OPEN 1-CLOSED	
BI	64		SWITCH INPUT #32 ON	0-OPEN 1-CLOSED	
BI	65		SWITCH INPUT #33 OFF	0-OPEN 1-CLOSED	
BI	66		SWITCH INPUT #33 ON	0-OPEN 1-CLOSED	
BI	67		SWITCH INPUT #34 OFF	0-OPEN 1-CLOSED	
BI	68		SWITCH INPUT #34 ON	0-OPEN 1-CLOSED	
BI	69		SWITCH INPUT #35 OFF	0-OPEN 1-CLOSED	
BI	70		SWITCH INPUT #35 ON	0-OPEN 1-CLOSED	
BI	71		SWITCH INPUT #36 OFF	0-OPEN 1-CLOSED	
BI	72		SWITCH INPUT #36 ON	0-OPEN 1-CLOSED	
BI	73		SWITCH INPUT #37 OFF	0-OPEN 1-CLOSED	

Table N.1 – ILC Apprentice Input N2 Point Map

NETWORK POINT TYPE	NETWORK POINT ADDRESS	UNITS	POINT DESCRIPTION	RANGE/VALUE	NOTES
BI	74		SWITCH INPUT #37 ON	0-OPEN 1-CLOSED	
BI	75		SWITCH INPUT #38 OFF	0-OPEN 1-CLOSED	
BI	76		SWITCH INPUT #38 ON	0-OPEN 1-CLOSED	
BI	77		SWITCH INPUT #39 OFF	0-OPEN 1-CLOSED	
BI	78		SWITCH INPUT #39 ON	0-OPEN 1-CLOSED	
BI	79		SWITCH INPUT #40 OFF	0-OPEN 1-CLOSED	
BI	80		SWITCH INPUT #40 ON	0-OPEN 1-CLOSED	
BI	81		SWITCH INPUT #41 OFF	0-OPEN 1-CLOSED	
BI	82		SWITCH INPUT #41 ON	0-OPEN 1-CLOSED	
BI	83		SWITCH INPUT #42 OFF	0-OPEN 1-CLOSED	
BI	84		SWITCH INPUT #42 ON	0-OPEN 1-CLOSED	
BI	85		SWITCH INPUT #43 OFF	0-OPEN 1-CLOSED	
BI	86		SWITCH INPUT #43 ON	0-OPEN 1-CLOSED	
BI	87		SWITCH INPUT #44 OFF	0-OPEN 1-CLOSED	
BI	88		SWITCH INPUT #44 ON	0-OPEN 1-CLOSED	
BI	89		SWITCH INPUT #45 OFF	0-OPEN 1-CLOSED	
BI	90		SWITCH INPUT #45 ON	0-OPEN 1-CLOSED	
BI	91		SWITCH INPUT #46 OFF	0-OPEN 1-CLOSED	
BI	92		SWITCH INPUT #46 ON	0-OPEN 1-CLOSED	
BI	93		SWITCH INPUT #47 OFF	0-OPEN 1-CLOSED	
BI	94		SWITCH INPUT #47 ON	0-OPEN 1-CLOSED	
BI	95		SWITCH INPUT #48 OFF	0-OPEN 1-CLOSED	
BI	96		SWITCH INPUT #48 ON	0-OPEN 1-CLOSED	

Table N.1 – ILC Apprentice Input N2 Point Map

NETWORK POINT TYPE	NETWORK POINT ADDRESS	UNITS	POINT DESCRIPTION	RANGE/VALUE
BO	1		RELAY OUTPUT #1	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	2		RELAY OUTPUT #2	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	3		RELAY OUTPUT #3	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	4		RELAY OUTPUT #4	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	5		RELAY OUTPUT #5	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	6		RELAY OUTPUT #6	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	7		RELAY OUTPUT #7	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	8		RELAY OUTPUT #8	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	9		RELAY OUTPUT #9	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	10		RELAY OUTPUT #10	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	11		RELAY OUTPUT #11	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	12		RELAY OUTPUT #12	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	13		RELAY OUTPUT #13	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	14		RELAY OUTPUT #14	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	15		RELAY OUTPUT #15	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	16		RELAY OUTPUT #16	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	17		RELAY OUTPUT #17	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	18		RELAY OUTPUT #18	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	19		RELAY OUTPUT #19	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	20		RELAY OUTPUT #20	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	21		RELAY OUTPUT #21	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	22		RELAY OUTPUT #22	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	23		RELAY OUTPUT #23	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	24		RELAY OUTPUT #24	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option

Table N.1 – ILC Apprentice Relay Output N2 Point Map

NETWORK POINT TYPE	NETWORK POINT ADDRESS	UNITS	POINT DESCRIPTION	RANGE/VALUE
BO	25		RELAY OUTPUT #25	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	26		RELAY OUTPUT #26	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	27		RELAY OUTPUT #27	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	28		RELAY OUTPUT #28	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	29		RELAY OUTPUT #29	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	30		RELAY OUTPUT #30	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	31		RELAY OUTPUT #31	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	32		RELAY OUTPUT #32	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	33		RELAY OUTPUT #33	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	34		RELAY OUTPUT #34	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	35		RELAY OUTPUT #35	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	36		RELAY OUTPUT #36	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	37		RELAY OUTPUT #37	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	38		RELAY OUTPUT #38	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	39		RELAY OUTPUT #39	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	40		RELAY OUTPUT #40	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	41		RELAY OUTPUT #41	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	42		RELAY OUTPUT #42	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	43		RELAY OUTPUT #43	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	44		RELAY OUTPUT #44	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	45		RELAY OUTPUT #45	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	46		RELAY OUTPUT #46	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	47		RELAY OUTPUT #47	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option
BO	48		RELAY OUTPUT #48	0-OFF (Open) 1-ON (Closed) 2-OFF w/Timer Option

Table N.1 – ILC Apprentice Relay Output N2 Point Map

NETWORK POINT TYPE	NETWORK POINT ADDRESS	INPUTS	RANGE/VALUE	NOTES
BO	201	01	0- Input Enable 1- Input Disable	
BO	202	02	0- Input Enable 1- Input Disable	
BO	2 03	03	0- Input Enable 1- Input Disable	
BO	204	04	0- Input Enable 1- Input Disable	
BO	205	05	0- Input Enable 1- Input Disable	
BO	206	06	0- Input Enable 1- Input Disable	
BO	207	07	0- Input Enable 1- Input Disable	
BO	208	08	0- Input Enable 1- Input Disable	
BO	209	09	0- Input Enable 1- Input Disable	
BO	210	10	0- Input Enable 1- Input Disable	
BO	211	11	0- Input Enable 1- Input Disable	
BO	212	12	0- Input Enable 1- Input Disable	
BO	213	13	0- Input Enable 1- Input Disable	
BO	214	14	0- Input Enable 1- Input Disable	
BO	215	15	0- Input Enable 1- Input Disable	
BO	216	16	0- Input Enable 1- Input Disable	
BO	217	17	0- Input Enable 1- Input Disable	
BO	218	18	0- Input Enable 1- Input Disable	
BO	219	19	0- Input Enable 1- Input Disable	
BO	220	20	0- Input Enable 1- Input Disable	
BO	221	21	0- Input Enable 1- Input Disable	
BO	222	22	0- Input Enable 1- Input Disable	
BO	223	23	0- Input Enable 1 -Input Disable	
BO	224	24	0- Input Enable 1- Input Disable	

Table N.1 – ILC Apprentice Input Disable/Enable N2 Point Map

NETWORK POINT TYPE	NETWORK POINT ADDRESS	INPUTS	RANGE/VALUE	NOTES
BO	225	25	0- Input Enable 1- Input Disable	
BO	226	26	0- Input Enable 1- Input Disable	
BO	227	27	0- Input Enable 1- Input Disable	
BO	228	28	0- Input Enable 1- Input Disable	
BO	229	29	0- Input Enable 1- Input Disable	
BO	230	30	0- Input Enable 1- Input Disable	
BO	231	31	0- Input Enable 1- Input Disable	
BO	232	32	0- Input Enable 1- Input Disable	
BO	233	33	0- Input Enable 1- Input Disable	
BO	234	34	0- Input Enable 1- Input Disable	
BO	235	35	0- Input Enable 1- Input Disable	
BO	236	36	0- Input Enable 1- Input Disable	
BO	237	37	0- Input Enable 1- Input Disable	
BO	238	38	0- Input Enable 1- Input Disable	
BO	239	39	0- Input Enable 1- Input Disable	
BO	240	40	0- Input Enable 1- Input Disable	
BO	241	41	0- Input Enable 1- Input Disable	
BO	242	42	0- Input Enable 1- Input Disable	
BO	243	43	0- Input Enable 1- Input Disable	
BO	244	44	0- Input Enable 1- Input Disable	
BO	245	45	0- Input Enable 1- Input Disable	
BO	246	46	0- Input Enable 1- Input Disable	
BO	247	47	0- Input Enable 1 -Input Disable	
BO	248	48	0- Input Enable 1- Input Disable	

Table N.1 – ILC Apprentice Input Disable/Enable N2 Point Map

Alabama,Birmingham,33,87
Alabama,Gadsden,34,86
Alabama,Huntsville,34,86
Alabama,Mobile,30,88
Alabama,Montgomery,32,86
Alaska, Anchorage, 61,150
Alaska, Fairbanks, 65,148
Alaska, Juneau, 58,135
Arizona,Flagstaff,35,111
Arizona,Phoenix,33,112
Arizona,Tucson,32,111
Arizona,Yums,32,114
Arkansas,Fort Smith,35,94
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Michigan,Bay City,43,84
Michigan,Detroit,42,83
Michigan,Flint,43,83
Michigan,Grand Rapids,43,85
Michigan,Jackson,42,84
Michigan,Kalamazoo,42,85
Michigan,Lansing,42,84
Michigan,Saginaw,43,84
Minnesota,Duluth,47,92
Minnesota,Minneapolis,45,93
Minnesota,Rochester,44,92
Minnesota,St. Cloud,45,94
Minnesota,St. Paul,45,93
Mississippi,Biloxi,30,89
Mississippi,Gulfport,30,89
Mississippi,Jackson,32,90
Mississippi,Natchez,31,91
Missouri,Columbia,38,92
Missouri,Joplin,37,94
Missouri,Kansas City,39,94
Missouri,Springfield,37,93
Missouri,St. Joseph,40,95
Missouri,St. Louis,38,90
Montana,Billings,46,108
Montana,Butte,46,112
Montana,Great Falls,47,111
Montana,Helena,46,112
Nebraska,Lincoln,41,96
Nebraska,Omaha,41,96
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Nevada,Reno,39,120
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New York,Troy,42,73
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Salem,36,80
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Texas,Fort Worth,32,97
Texas,Galveston,29,95
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Texas,Laredo,27,99
Texas,Lubbock,33,102
Texas,Marshall,32,94
Texas,San Antonio,29,95
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Utah,Provo,40,111
Utah,Salt Lake City,41,112
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Wisconsin,Madison,43,89
Wisconsin,Milwaukee,43,88
Wisconsin,Racine,42,88
Wisconsin,Sheboygan,44,87
Wisconsin,Superior,46,92
Wyoming,Cheyenne,41,105
Wyoming,Sheridan,45,107

P.1 Overview

ILC Corporation manufactures a photo control system specially designed to work with the ILC Apprentice controller.

P.2 Hardwired Model

The hardwired photo-controller system features two main components: the controller board and the photo sensor. Both indoor and outdoor sensors are available. The photo control features an indoor range of 1-100 foot candles (fc) and an outdoor range of 1-1000 foot candles. The photo controller supports individually selectable ON/OFF set points. There is also a time delay feature to prevent nuisance switching. The photo control board is powered by either a 8-12 VAC or 8-12 VDC power supply. See Figures P.1 and P.2 for detailed set-up and installation instructions.

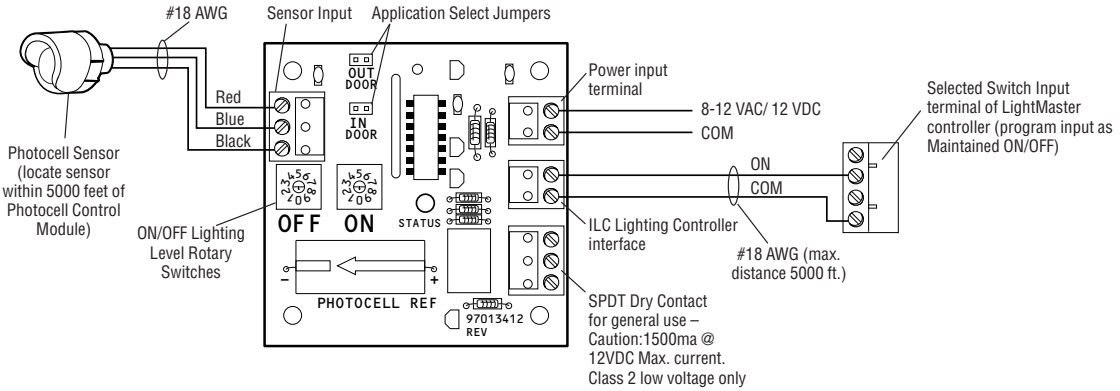
P.3 Programming

1. Program the the ILC Apprentice controller switch input that the photo-controller is wired to as a MAINTAINED ON/OFF switch TYPE.
2. Program the Input/Relay control of the relay or relay group that the switch controls.

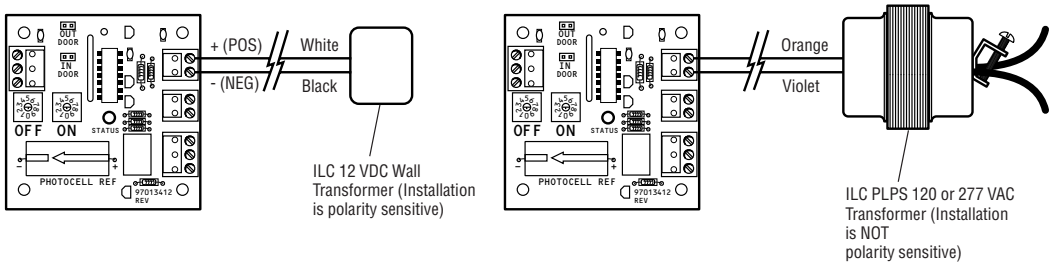
Consult Section 3 of this manual for detailed programming information.

Photocell Controller Board Installation Guide

Wiring Overview



Power Supply Termination

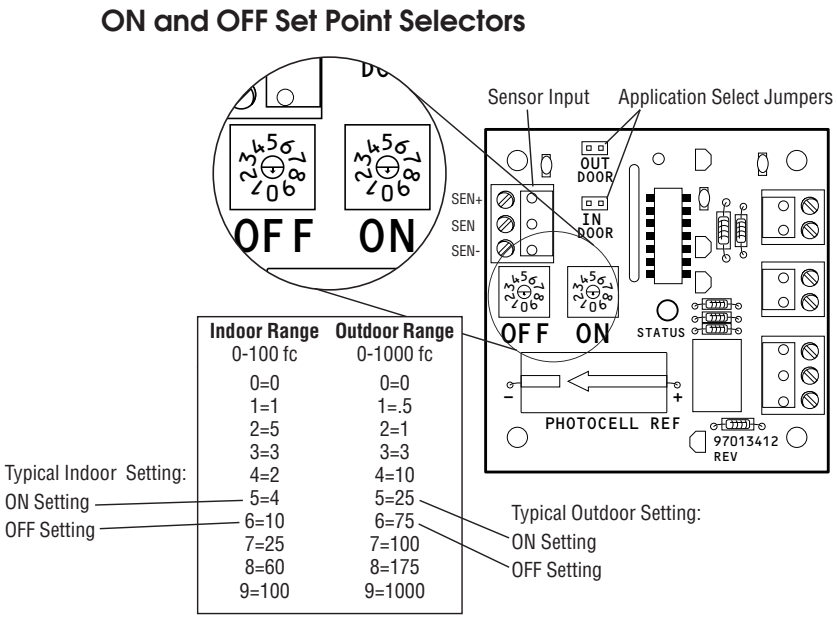


Installation

1. Mount the control module either in, or remote from, the lighting control device. When interfacing with a ILC Apprentice controller, it is usually easiest to mount the photocell control module in the low voltage section of the controller. If choosing to mount the control module remotely, do not exceed a distance of 5000 feet from the control module to the ILC Apprentice controller. Use 18 gauge conductors. If the photocell controller is used to interface with non-ILC manufactured equipment, consult the manufacturer's literature for guidance.
2. Install the sensor and terminate it to the sensor inputs on the photocell control module. Use 18 gauge wire and keep the distance under 5000 feet. If the sensor is for an outdoor application, mount it on a roof or equal facing north with its hood on top and facing away from any night time light sources. Indoor sensors should be installed 6-8 feet from windows, with the sensing eye pointed down and away from any direct lighting.
3. Depending on the application, wire the photocell control module output to the input of the lighting control device. Use 18 gauge conductors. Use a dedicated output when interfacing with an ILC controller. (Program the selected lighting controller switch input as Maintained ON/OFF.) Use the SPDT dry contact output when interfacing with other devices. **Caution: Do not exceed 1500ma @ 30 VDC.**
4. Wire the 12 VAC or VDC power source to the photocell control module power input terminals.

Figure P.1– Hardwired Photocell Installation

Photocell Controller Board Setup Guide



Description

The ILC Photocell is an electronic device which supports the ON/OFF control of lighting circuits. The lighting circuits are controlled indirectly by means of the photocell controller module maintained contact closure signals sensed by the switch inputs of ILC Apprentice lighting controllers or by dry contact outputs to other devices which control line voltage loads via low voltage (Class 2) signals. The photocell control module can be mounted either on the manufacturer provided plastic channel for installation in the control section of the ILC Apprentice lighting controller, or in an enclosure suitable for remote mounting. The photocell control module requires either a 8-12 VAC or 12 VDC power source to operate. It is recommended that the power source feature a disconnecting means to facilitate service.

The photocell control module outputs respond when the photocell sensor detects the user selected ON and OFF foot candle level. Both outdoor and indoor sensors are available depending on the required application.

Setup (See above example)

1. Jumper the photocell control module for either outdoor or indoor depending on your application.
2. Set the desired ON and OFF foot candle levels by turning the rotary switches to the desired settings.
   Typical settings:
   outdoor – ON at 25fc, OFF at 75fc;
   indoor – ON at 4fc, OFF at 10fc.
3. Energize the 12 VAC or 12 VDC power.
4. Simulate dark and light conditions at the sensor and make any required adjustments on the rotary switches. Note: On power up there is a 15-25 minute setup period during which the controller will react instantly. After the setup time has expired, there is an 8-12 second time delay to prevent nuisance switching during normal operation.

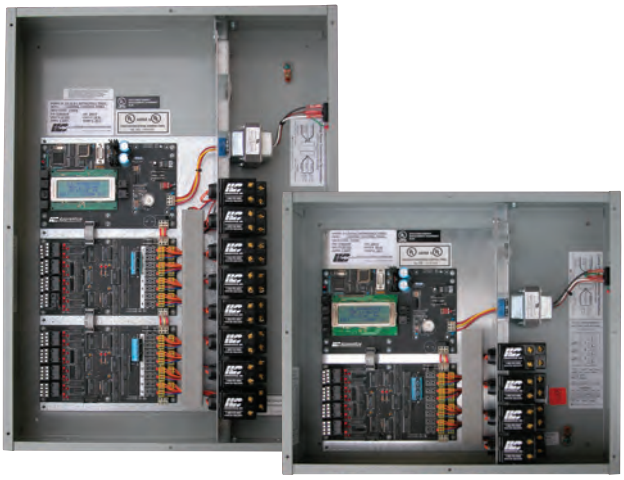
Figure P.2– Hardwired Photocell Setup

- Product Cut Sheets
- Switch Wiring Examples
- Control Schedule Blanks

Apprentice

Programmable Lighting Control

- Stand alone lighting control solution
- Next business day shipping
- Panel sizes to accomodate 8, 16, 32 and 48 relay outputs
- 365-day programmable Lighting Control Panel
- 8-48 Inputs and Outputs
- RS-232 interface standard
- 48 programmable relay groups, presets, timers
- True relay status with Pilot Light
- ON/OFF push button for each relay
- Daylight Savings Time adjustment and Astro Clock standard
- Optional Add-on Modules
- UL Listed (508 and 916) FCC approval for commercial use
- Title 24 certified, ASHRAE 90.1 compliant



Overview

The ILC Apprentice programmable lighting control panel is ready and waiting for your stand alone lighting control applications. For those times when you have an immediate need for stand alone lighting control, the ILC Apprentice is readily available to ship next business day. Add-on cards are easy to install and add capabilities like DMX control, N2 or MODBUS interface, and DTMF telephone switching, The ILC Apprentice lighting control panel ships complete with a comprehensive user guide that includes the documentation detail needed for a successful installation.

Features

Programming Options
- Integral keypad with 4-line LCD display
- Optional LightMaster Pro Windows software

Comprehensive User Guide
- The ILC Apprentice includes a USER Guide, which includes all standard documentation required for basic stand alone applications

Relay Groups
- Relays may be assigned to any of 48 available groups or presets
- Relay groups may be assigned to multiple Timers, Switch Inputs, and other panel functions simplifying programming

Open/Close Times
- Lighting Control Schedules may adjust based on business (retail) Open/Close hours for easy adjustment when operating hours fluctuate
- Seven standard Open/Close times and 365 custom daily Open/Close times available
- Scheduled event may be programmed to occur before, after or at Open/Close times

Relay Functions
- Each relay may be programmed for ON only, OFF only or ON/OFF control
- Pulsed output for control of external devices such as lighting contactors or other systems
- HID multilevel control (specialized output control for multilevel HID ballasts including warm-up sequence)

Switch Types
- The ILC Apprentice may be programmed to accept virtually any type of switch input, momentary or maintained
- Easy direct connection to motion and photo sensing devices via dry contact input
- Override inputs can enable or disable any relay or group of relays
- Input disable based on time of day

Switch Input to Relay Output Mapping
- All switch to relay settings are completely soft, requiring no field rewiring when changes are required
- Any switch can control any combination of 1 to 48 relays

Automatic Power-Up Settings
- Relays may be programmed to automatically return to ON, OFF or remaining in the state they were in prior to the outage

After Hours Sweeps
- Individual relay or groups of relays may be programmed to be swept OFF during non-operational hours

Daylight Saving Time Adjustment
- Automatic adjustment for daylight saving changes (may be enabled or disabled from keypad or software)

Astronomical Clock
- Automatic calculation of Sunrise and Sunset based on date and geographic position
- Scheduled events may be programmed to occur before, after or on an astro event

Blink Alert
- Prior to a scheduled OFF event, lighting loads programmed for a Blink Alert will be momentarily turned OFF then back ON to alert occupants. To avoid the pending OFF sweep, the user simply turns their local switch ON again during the adjustable period (default is 5 min.) prior to the OFF sweep.

Add-On Modules
- Easy to install add-on modules for applications requiring DMX 512 control, Modicon® MODBUS or Metasys® N2 interface, or DTMF telephone switching

INTELLIGENT LIGHTING CONTROLS, INC.

5229 Edina Industrial Boulevard
Minneapolis. Minnesota 55439
Phone 952 829 1900
FAX 952 829 1901
1-800-922-8004
www.ilc-usa.com

ILC Apprentice

Programmable Lighting Control

Specifications

Physical:
- LightMaster lighting controllers are provided with pre-drilled mounting holes for easy mounting to unistrut framing or directly to wall
- All panels provided with a standard hinged locking door with dead front protection on the line voltage relay side. Optional flush mount hinged locking door is available
- UL, NEMA-1 enclosure

Electrical:
- 120 or 277 VAC power supply ready
- 2R9C relays are 20 amp rated for 120, 277 VAC

(See Relay section of the ILC Catalog for more 2R9C relay specifications)

Operating Environment:
- Location: Interior space
- Operating Temperature: 0° to 50° C (32° to 112° F)
- Relative Humidity: 10% to 90% Non-condensing

Certifications:
- UL, CUL
- FCC approval for commercial and residential use
- California Title 24

Capacities:
- 1 to 48 2R9C relays (see table below)

Options:
- Flush mount hinged locking door
- Add-on Modules: easy to install modules for applications requiring Modicon® MODBUS or Metasys® N2 interface, DMX 512 control, or DTMF telephone switching

Configuration:
- Soft configuration with greater than 50 year EEPROM memory retention in absence of power
- Minimum 30 day clock retention

Ordering

Order a **ILC Apprentice** controller by choosing your options and filling in the number

ILC-AP - (1) - (2) - (3) - (4)

Sample: Order No. ILC-AP-16-16-HD-TL = ILC Apprentice controller in a size 16 enclosure with 16 relays, with hinged locking door and DTMF Telehone inteface module.

(1) Consult the chart to determine the enclosure size your panel requires. All enclosures are NEMA-1 type with hinged locking cover standard.

Enclosure Size Options

Enclosure Type	Relays	Width	Height	Depth
Apprentice 08	1 to 8	18 in.	15 in.	4 in.
Apprentice 16	1 to 16	18 in.	24 in.	4 in.
Apprentice 24	1 to 24	24 in.	36 in.	4 in.
Apprentice 32	1 to 32	24 in.	36 in.	4 in.
Apprentice 40	1 to 40	24 in.	48 in.	6 in.
Apprentice 48	1 to 48	24 in.	48 in.	6 in.

(2) Fill in the number of relays your installation requires, from 01 to 48.

(3) Fill in HD for an standard cover with hinged locking door, FL for optional flush mount cover.

(4) Use this space to order an optional add-on card to your Apprentice.

MB= MODBUS module provides integration to a MODBUS communication and control system

MX= DMX 512 module provides direct control of ON/OFF lighting or other loads from any DMX control device

N2 = N2 Metasys module provides integration into a Building Automation System (BAS) that uses the N2 communications protocol.

TL = DTMF telephone interface module provides Voice Prompted DTMF touch-tone telephone control and monitoring

A full line of compatible products including control software, photosensors, a wide variety of momentary or maintained switches, custom engraved plates and more are available. Consult factory or your local ILC Representative for more information.

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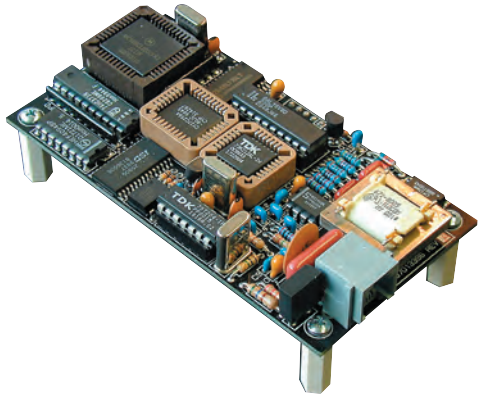
LIGHTMaster Telephone Add-On Module

Voice Prompted DTMF Telephone Control

- Control any relay, group of relays or preset scene from any touch-tone telephone
- As easy to use as your voice mail
- Voice prompted commands and instructions
- Simple plug-and-play installation



Overview

The LightMaster DTMF telephone add-on module can easily be added to any LightMaster programmable lighting control panel to provide Voice Prompted DTMF touch-tone telephone control and monitoring. DTMF control allows any touch-tone telephone to become a lighting control station. Through the use of DTMF control signals the system user can command relays or groups of relays ON or OFF or activate preset scenes, all from the convenience of any touch-tone telephone including cellular phones. With voice prompting, it's as easy to use as a voice mail system. There is never a need to remember complex commands of cryptic codes in order to operate the system.

Features

Programming Options:

- Once plugged into the LightMaster processor board, user has access to control and status via voice prompted commands. No programming required

DTMF Functions:
Remote Control and Monitoring

- Turn ON or OFF any relay or group of relays
- Activate preset scenes

True Status Reporting (Via Voice)

- Get voice system operation status report from any touch-tone telephone
- Get voice status of any switch input or relay output from any touch-tone telephone

Online Operational Instructions and Prompting

- DTMF commands and control functions are supported by true voice prompting that can guide the user through operational commands and give instructions as to the use of the system

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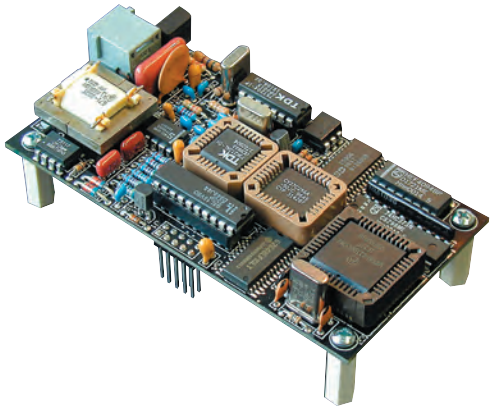
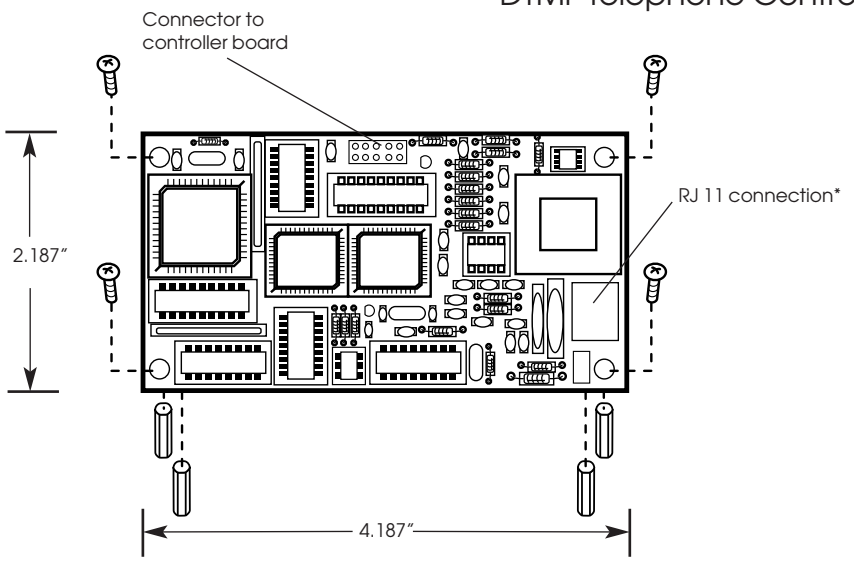
LIGHTMaster Telephone Add-On Module

Voice Prompted DTMF Telephone Control





Specifications

Physical:

- Plug-in module designed for mounting to LightMaster main board

Operating Environment:

- Location: Interior space
- Operating Temperature: 0° to 50° C (32° to 112° F)
- Relative Humidity: 10% to 90% Non-condensing

Certifications:

- UL
- FCC Approval for commercial and residential use

***NOTE: requires standard analog telephone line for operation**

How to Order

Ordering a **LightMaster Telephone Interface Add-on Module**
Order No. LMTI (sample)
LMTI

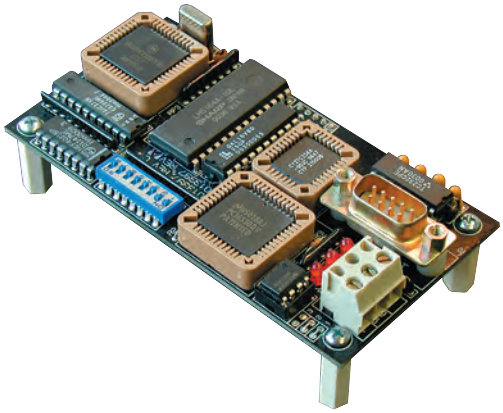
INTELLIGENT LIGHTING CONTROLS, INC.

5229 Edina Industrial Boulevard
Minneapolis. Minnesota 55439
Phone 952 829 1900
FAX 952 829 1901
1-800-922-8004
www.ilc-usa.com

LIGHTMaster DMX Interface Module

USITT DMX 512

- Use USITT standard DMX 512 control signals
- Connect directly to any DMX controller
- Adjustable ON and OFF set points
- Support full 512 channels of DMX
- Cost effective alternative to non-dims
- Adjustable DMX frame filter
- Adjustable Lock ON/Lock OFF feature



Overview

The LightMaster DMX interface add-on module can easily be added to any LightMaster programmable lighting control panel to provide for direct control of ON/OFF lighting or other loads from any DMX control device. Any of the available 512 DMX control channels may be mapped to control individual relays.

Features

Programming

- Once plugged into the lighting control panel, DMX control functions can be programmed and reviewed directly from the lighting panel's keypad
- DMX control functions can also be performed from a PC through the use of LightMaster Pro for Windows software

DMX 512 Control

- Adjustable ON and OFF set points
- Each relay may be locked ON/OFF based on DMX levels
- Map any relay to any DMX control channel
- Adjustable DMX frame filter

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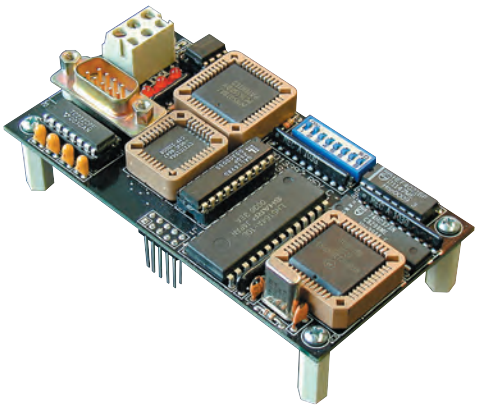
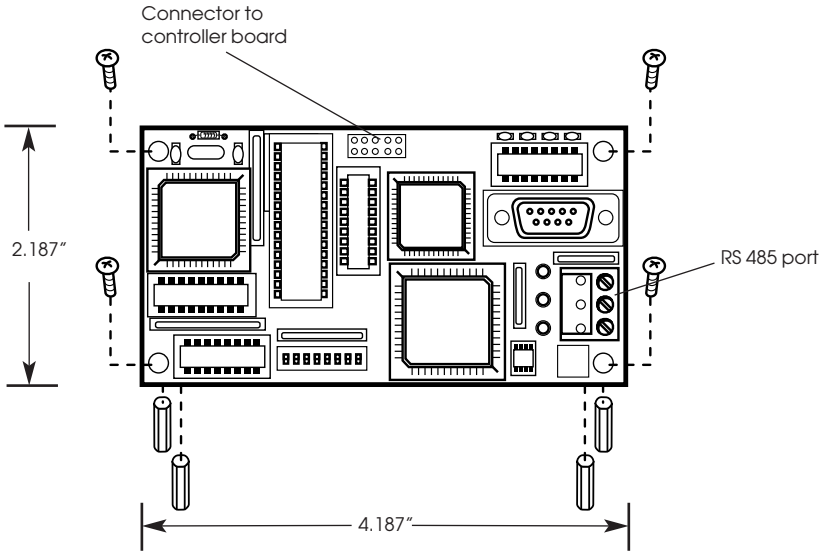
LIGHTMaster DMX Interface Module

USITT DMX 512





Specifications

Physical:

- Plug-in module designed for mounting to LightMaster main board

Operating Environment:

- Location: Interior space
- Operating Temperature: 0° to 50° C (32° to 112° F)
- Relative Humidity: 10% to 90% Non-condensing

Certifications:

- UL
- FCC Approval for commercial and residential use

Configuration:

- Soft configuration

How to Order

Ordering a **LightMaster DMX Add-on Module**

Order No. DMX (sample)

DMX

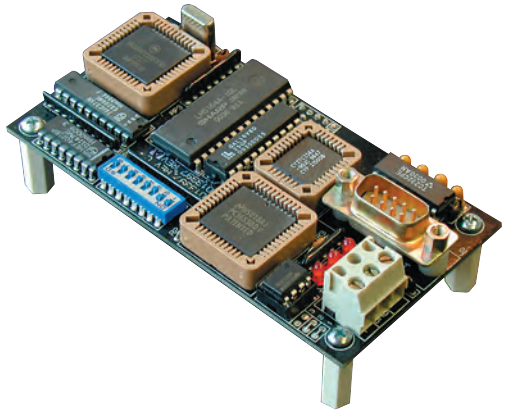
INTELLIGENT LIGHTING CONTROLS, INC.

5229 Edina Industrial Boulevard
Minneapolis. Minnesota 55439
Phone 952 829 1900
FAX 952 829 1901
1-800-922-8004
www.ilc-usa.com

LIGHTMaster Metasys N2 Serial Interface

N2 Protocol

- Use Metasys N2 control protocol
- Connects directly to the N2 Metasys RS 485 bus
- Allows status reporting and direct control of relays
- Metasys® Connectivity Partner



Overview

The LightMaster Controller(s) can be integrated into a Building Automation System (BAS) that uses the N2 communications protocol. The host system can then poll the status of the LightMaster Controller inputs and outputs and issue ON/OFF commands to the LightMaster's relay outputs.

Features

Programming

- The LightMaster must be equipped with a N2 add-on module that can be addressed between 1 and 255. The network cable is a RS 485 two-wire shielded twisted pair.
- Once plugged into the lighting control panel, BAS software can be programmed to control relays in the LightMaster panel.
- All local control features for the relay panel will continue to be operable.

N2 Control

- Only BI and BO point types are used.

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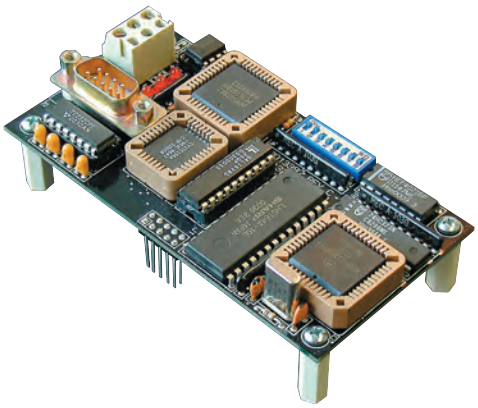
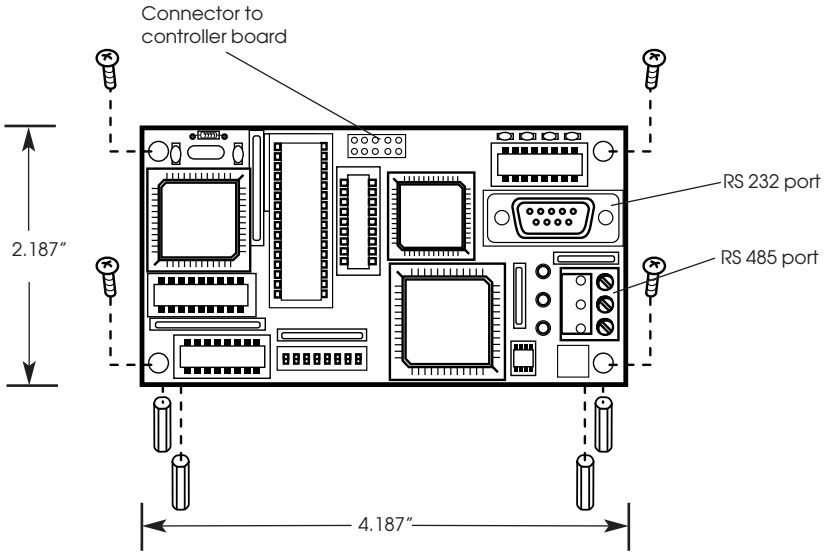
LIGHTMaster Metasys N2 Serial Interface

N2 Protocol





Specifications

Physical:

- Plug-in module designed for mounting to LightMaster main board

Operating Environment:

- Location: Interior space
- Operating Temperature: 0° to 50° C (32° to 112° F)
- Relative Humidity: 10% to 90% Non-condensing

Certifications:

- UL
- Metasys® Connectivity Partner
- FCC Approval for commercial and residential use

Configuration:

- Soft configuration

How to Order

Ordering a **LightMaster Metasys N2 Serial Interface**
Order No. LMSI-N2 (sample)

LMSI-N2

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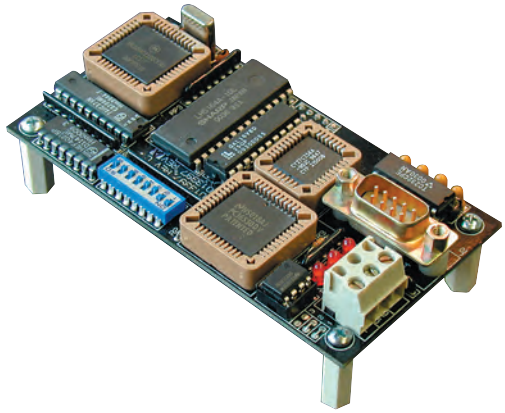
Minneapolis. Minnesota 55439
Phone 952 829 1900
FAX 952 829 1901
1-800-922-8004
www.ilc-usa.com

LIGHTMaster MODBUS Serial Interface

MODBUS Protocol

- Uses standard ASCII or RTU control protocol
- Connect directly to the MODBUS RS 485 bus
- Allows status reporting and direct control of relays
- Adjustable protocol settings



Overview

The LightMaster MODBUS interface add-on module can easily be added to any LightMaster programmable lighting control panel to provide for integration to your MODBUS communication and control system, allowing the LightMaster to become a slave node on the MODBUS network.

Features

Programming

- The MODBUS card can be addressed between 1 and 255. The network cable is a RS485 two-wire shielded twisted pair

Supported Commands

- 01 Read coil status
- 02 Read input status
- 05 Force singe coil
- 15 Force multiple coils

Adjustable Protocol Settings

- Standard ASCII or RTU
- Baud rate from 4800 to 38400
- Parity adjustment: ODD, EVEN, or NONE

For more information refer to Modicon Modbus Protocol Reference Guide (PI-MBUS-300)

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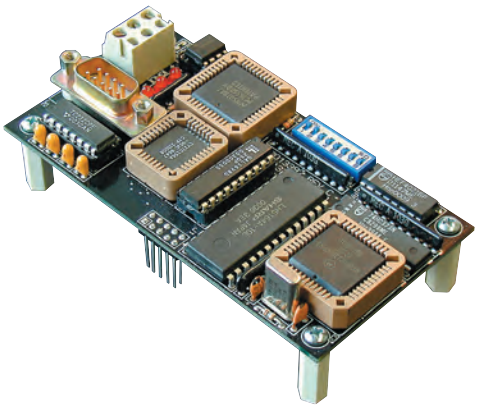
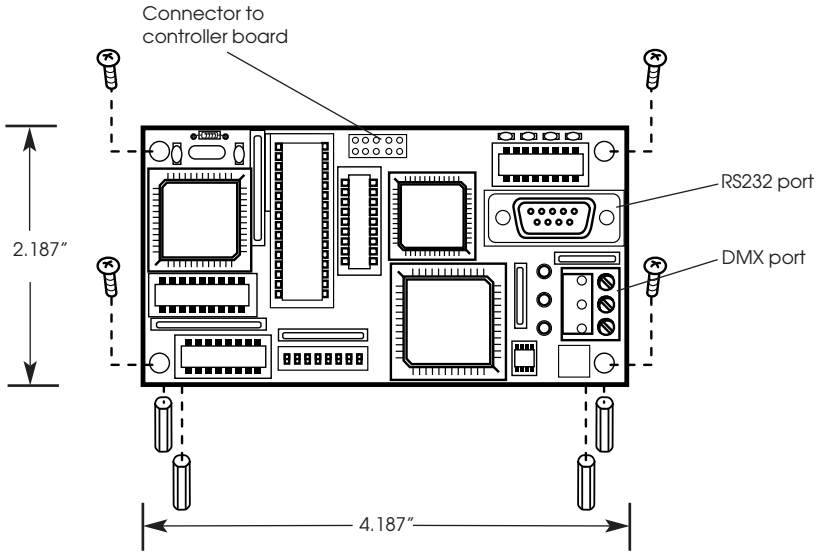
LIGHT*Master*

MODBUS Serial Interface

MODBUS Protocol





Specifications

Physical:

- Plug-in module designed for mounting to LightMaster main board

Operating Environment:

- Location — Interior space
- Operating Temperature — 0° to 50° C (32° to 112° F)
- Relative Humidity — 10% to 90% Non-condensing

Certifications:

- UL
- FCC Approval for commercial and residential use

Configuration:

- Soft configuration

How to Order

Ordering a **LightMaster MODBUS Add-on Module**
Order No. LMSI-MOD (sample)
LMSI-MOD

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2R9 Relays (with pilot contacts)

Magnetically Latched Relays

- Magnetically latching contacts
- 1 amp 30 volts AC/DC isolated contacts for status feedback or pilot lights
- Single moving part design
- Operates in any position
- Unmatched endurance
  - — 200,000 (ON/OFF) cycles, at FULL LOAD
  - — 1,000,000 (ON/OFF) cycles, at no load
- 20 amp 120, 277 or 347 VAC operation
- UL listed, FCC approval for commercial and residential use

2R9C

Overview

The 2R9 Series of relays are designed and manufactured to be the longest-lasting, most reliable relays available. By incorporating a unique single moving part (the contacts) design, both endurance and reliability are significantly enhanced. Compare our 200,000 ON/OFF cycle FULL LOAD and 1,000,000 no load ratings with any other relay in the industry. We're confident you will agree that for reliability and endurance, ILC's 2R9 Relay Series simply can't be beat. ILC 2R9 relays are magnetically latched, requiring only a momentary rectified AC or DC pulse to open or close the contacts.

Features

General Information

- UL Listed
- Mounts in standard ½" K.O. .825" - .875" diameter, 14 or 16 gauge material
- Operates in any position

Line Voltage Characteristics

- Contacts: SPST Maintained (permanent magnet latching)
- Terminals:2 terminals, 2 back wiring holes per terminal for feed through wiring
- Screw-actuated clamps for use with #14-10AWG solid or stranded copper wire only

Low Voltage Characteristics

- Split coil: ½ for "ON", ½ for "OFF"
- Compatible with standard interface drivers
- Operating voltage:
  - — 18–30 VAC rectified
  - — 12–24 VDC filtered
- Duty rating: Momentary
- Minimum activating pulse time: 17 milliseconds
- Coil Impedance: 68 – 73 ohms at 60Hz, 50 – 60 ohms DC resistance
- Switching power required for each 2R relay is:
  - — 2.2 VA per relay at 24 VAC rectified
  - — 175 mA per relay at 12 VDC
  - — 350 mA per relay at 24 VDC
- Status contacts: 1 amp AC/DC

Application Considerations

- **Relays Connected in Parallel –** Two or more relays connected in parallel, by grouping red leads and black leads, will operate together. The maximum number of relays connected in parallel is determined by the capacity of the power supply and the switch contact rating.

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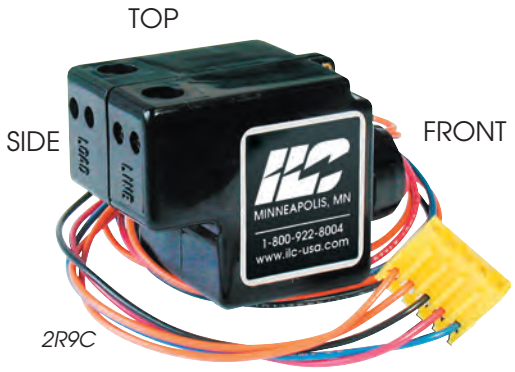
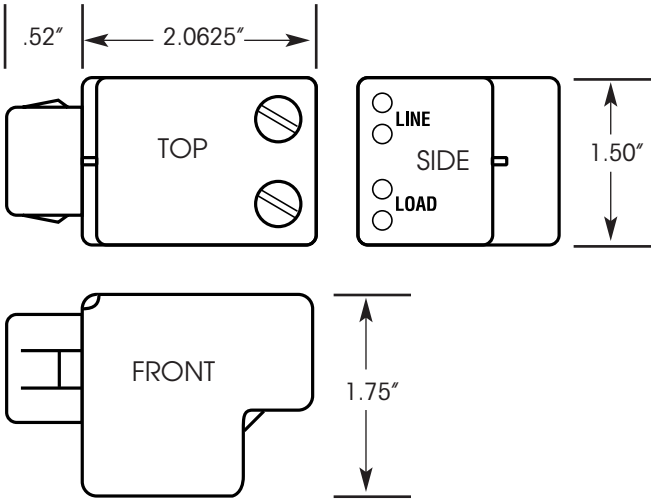
2R9 Relays (with pilot contacts)

Magnetically Latched Relays





Specifications

Physical:
- Mounts in standard ½″ K.O. .825″ – .875″
- Operates in any position

Electrical:
- 120, 277 or 347 VAC
- Motor Loads
  - — 1 Hp @120VAC
  - — 1½ Hp @277VAC
- 20 amp Ballast 120, 277 or 347 VAC
- Resistive loads: 20 amps 120, 277 or 347 VAC

Connectors:
- Leads available in plain wire (no connector), C connector (5-pin female connector), EZ connector (quick disconnect terminals for standard .187″ x .020″ male tabs)

Operating Environment:

• Location	Interior Space
• Operating Temperature	0° to 50° C (32° to 112° F)
• Relative Humidity	10% to 95% Non-condensing
• Atmosphere	Non-explosive, Non-corrosive
• Vibration	Stationary application NEMA Level A

Certifications:
- UL
- FCC Approval for commercial and residential use

How to Order

Ordering a **2R9** Relay

Order No. 2R9C (sample)

2R9 ___

P= Plain wire
C= 5-pin female connector
EZ= Quick disconnect terminals

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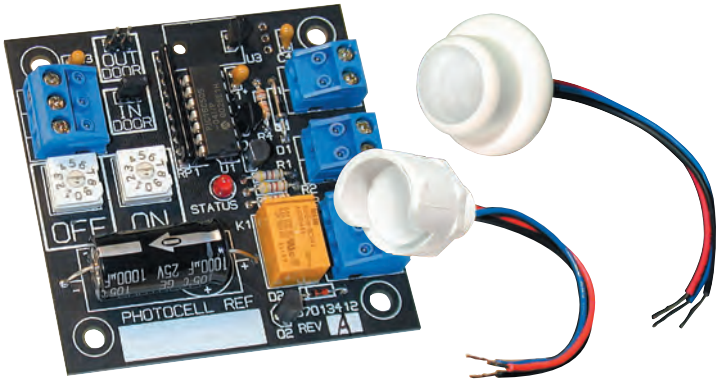
Hardwire Photo Sensor

Hard Wired Photo Sensor Controller
Indoor or Outdoor Sensor

- Indoor or Outdoor sensors
- Indoor range 1 to 100 fc
- Outdoor range 1 to 1000 fc
- Individually adjustable On and OFF set points
- Dry contact output
- Hard wired directly to lighting control panel inputs



Overview

The ILC Photo Sensor is designed to provide a simple to use, easily adjustable photo sensing device that can detect the need for artificial lighting and instruct the lighting control panel to either turn ON or OFF lighting circuits when required. With individually adjustable ON and OFF levels, time delay to account for lightning and other momentary flashes of light and selectable indoor and outdoor foot candle ranges, the ILC Photo Sensor is the perfect add-on to any lighting control system.

Features

Sensors

- Completely digital sensor for accurate measurement of foot candle limits
- Indoor or Outdoor
- Sensor may be located up to 5000 feet from controller

Adjustments

- Selectable Indoor/Outdoor ranges
  - Indoor 1 to 100 fc
  - Outdoor 1 to 1000 fc
- Individually adjustable ON/OFF set points

Output and Interfacing

- Connect directly to lighting control panel inputs
- Isolated dry contact latched output for control of other systems or remote status pilot

Controller Mounting

- Controller can be mounted either in the lighting control panel or at a remote location up to 5000 feet away

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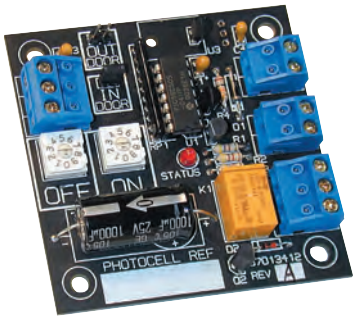
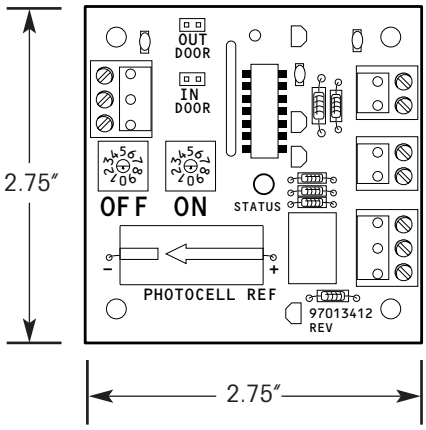
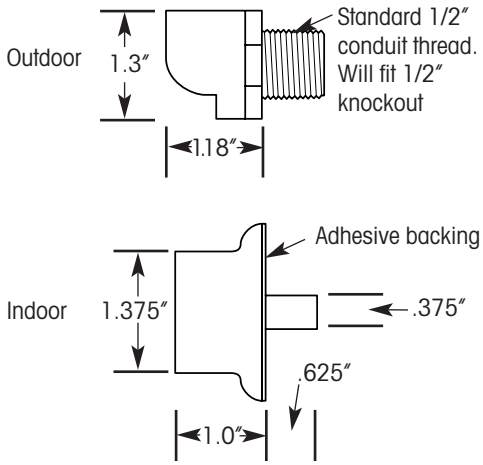
Hardwire Photo Sensor

Hard Wired Photo Sensor Controller
Indoor or Outdoor Sensor

Physical Dimensions







Specifications

Physical:
- Controller may be mounted remotely or at a lighting panel

Outdoor Sensor:
- Designed to be mounted to building exterior using 1/2″ LB or junction box fitting
- UV stabilized

Indoor Sensor:
- Designed to be mounted to ceiling tile or other ceiling structure
- UV stabilized

Electrical:
- Power Supply
  - 9 VAC
  - 12 VDC
- Lighting control panel output
  - Open collector
  - 50 milliamps
- Dry contact output
  - Latched output Form C SPDT
  - 2 amps 30 VDC

Mounting Options:
- Remote plastic mounting box with 120VAC wall transformer
- Mounted in relay panel with 120/277VAC panel transformer

Controller Operating Environment:
- Operating Temperature 0° to 50° C (32° to 112° F)

How to Order

Ordering a **Photo Sensor Controller**
Order No. PSC-OUT-REM(sample)

PSC- _ _ _ - _ _ _

IND= Indoor
OUT= Outdoor
PNL= Panel Mount
REM= Remote Mount

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NFP Series Switch Plates

Standard Low Voltage Switches & Plates

- Up to 8 Switches and LED pilot light on a single 2-gang plate
- Plate available in durable anodized brushed aluminum, stainless steel or painted white
- 1 to 8 Momentary center OFF rocker switches with or without LED pilot
- Available in 12 standard configurations
- Phenolic or engraved lettering (optional)
- Mounts to standard electrical gang boxes
- Switch available in black, white, or gray
- Custom options such as special colors or material available upon request

Overview

NFP series switch plates are an attractive space-saving alternative to standard electrical wall switches. In addition to taking up less space than conventional wall switches (up to 8 switches on a 2-gang plate), NFP plates and switches can be ordered with either phenolic or engraved labeling to clearly identify the purpose of each switch. With optional LED pilot lights and a choice of colors and materials, NFP plates and switches provide an economical solution to many low voltage switching requirements.

Features

Plates

- Anodized Brushed Aluminum
  - —Standard: Natural anodized finish
  - —Optional: Anodized colors available upon request
- Stainless Steel
- Painted
  - — Standard white
  - — Optional: Additional paint colors available upon request

Switches

- NFP switch plates are supplied with heavy-duty Single pole double throw (SPDT), Momentary center OFF rocker switches
- Each switch is designed to provide a tactile feel and click to confirm to the user that the switch has been depressed
- Switch size: 9/16 x 13/16
- Colors: Black, White, or Gray

Switch Identification

- Phenolic labels: Lettering is engraved into phenolic material attached to plate surface.
- Engraved: Lettering is engraved directly into plate surface.

LED Pilot Lights

- LED pilot lights give a visual confirmation of current control status. LED ON indicates controlled circuit is ON; LED OFF indicates controlled circuit is OFF.
- Each switch may be provided with a solid state LED pilot light
- Colors: Green or Red

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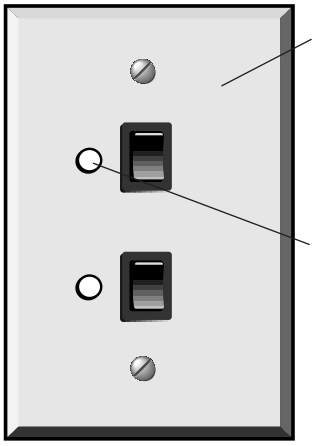
NFP Series Switch Plates

Standard Low Voltage Switches & Plates



NFP SERIES STANDARD CONFIGURATIONS

Plates without LEDs	Plates with LEDs	Plates without LEDs	Plates with LEDs
NFP-01-01-NA-AL	NFP-01-01-LED-AL	NFP-02-04-NA-AL	NFP-02-04-LED-AL
NFP-01-02-NA-AL	NFP-01-02-LED-AL	NFP-02-06-NA-AL	NFP-02-06-LED-AL
NFP-01-03-NA-AL	NFP-01-03-LED-AL	NFP-02-08-NA-AL	NFP-02-08-LED-AL

Other Configurations Available on Request

Specifications

Physical:

- Plate material:
  - — Aluminum
  - — Stainless Steel
  - — Painted White
- Mounts to standard electrical 1 or 2 gang switch box
- Mounting screws provided
- Switch size: 9/16 x 13/16
- Switch colors:
  - — White
  - — Black (standard)
- Switch Identification (optional):
  - — Phenolic Labels
  - — Engraved

Operating Environment:

• Location	Interior space
• Operating Temperature	0° to 50° C (32° to 112° F)
• Relative Humidity	10% to 95% Non-condensing
• Atmosphere	Non-explosive, Non-corrosive
• Vibration	Stationary application NEMA Level A

Electrical:

- Switch plates provided with center OFF momentary rocker switch for ON/OFF operation.
- Single pole double throw (SPDT), momentary
- Quiet "click" provides both tactile and sound feedback when actuated

How to Order

Ordering an **NFP Series** Switch Plate

Order No. NFP-02-04 (sample)

NFP - __ __ - __ __ - __ __ __ - __ __

Gang Size (1 or 2 Standard)

Required Switches (1 – 8 Standard)

LED Pilot (LED or NA)

Plate (AL= Aluminum SS= Stainless Steel PW= Painted White)

Custom configurations are available – consult factory for custom switch plate options

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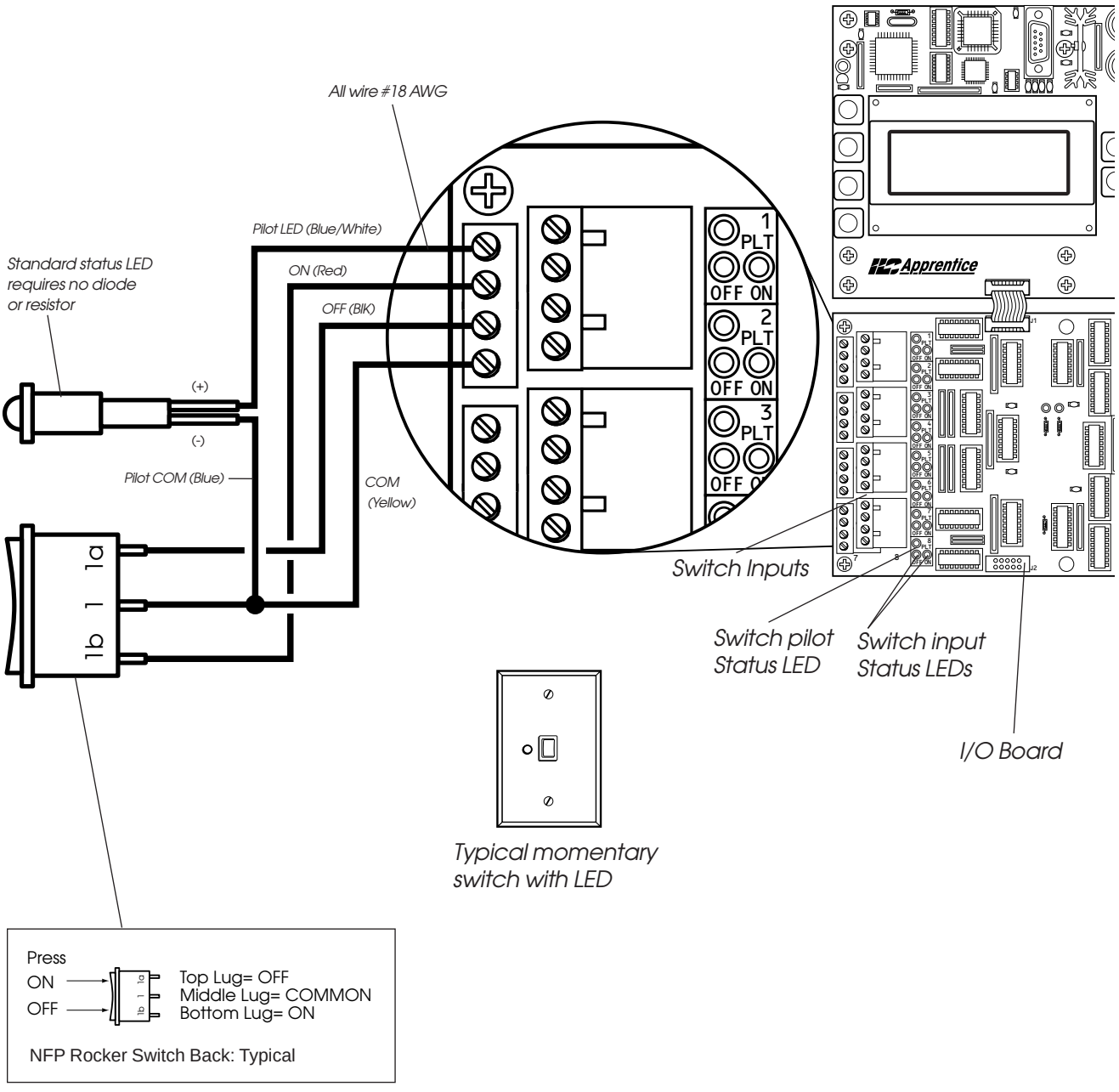
NFP Momentary Switch Installation



Typical Momentary NFP Switch Wiring

Energy Saving Lighting Controls

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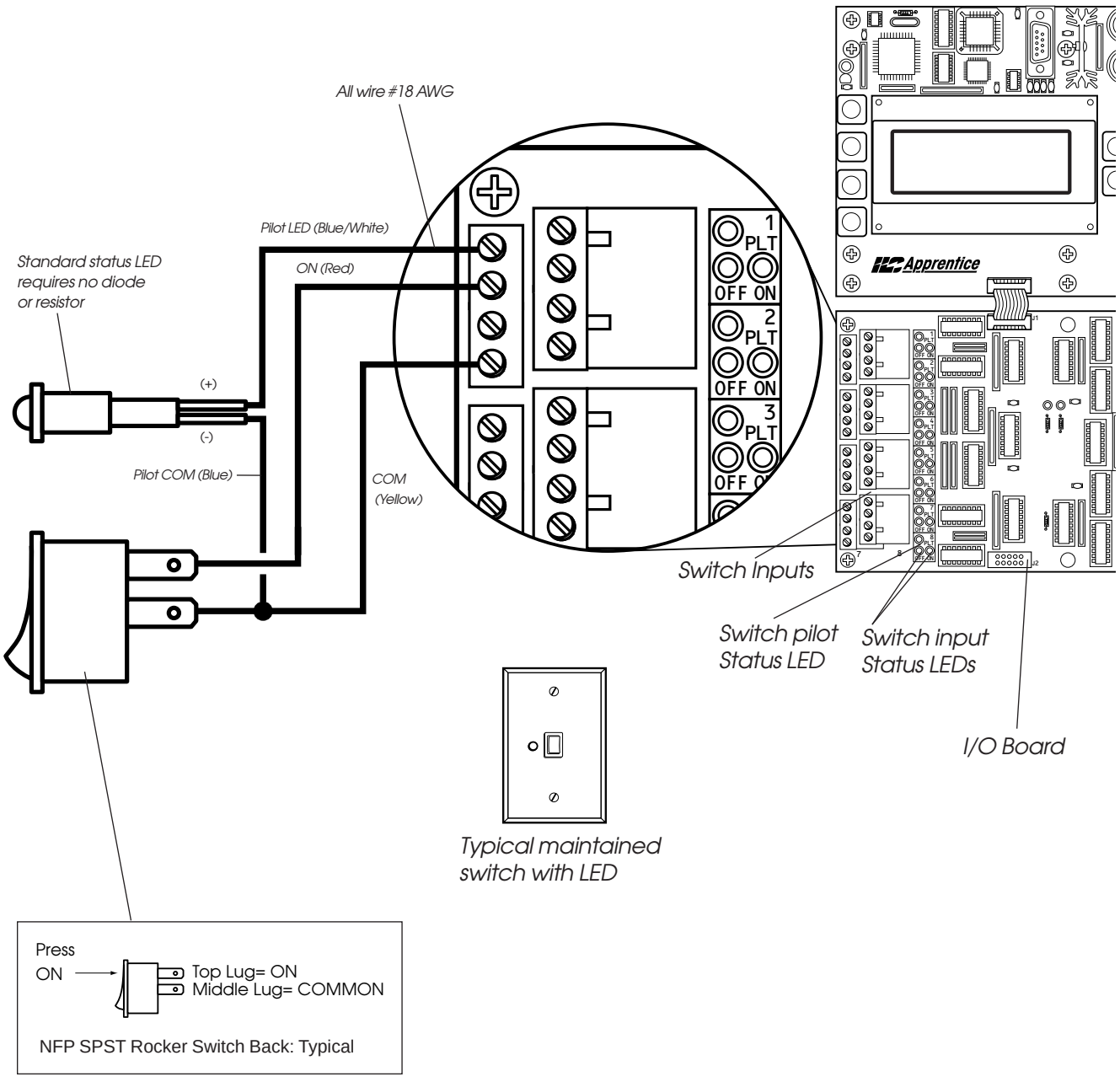
NFP Maintained Switch Installation



Typical Maintained NFP Switch Wiring

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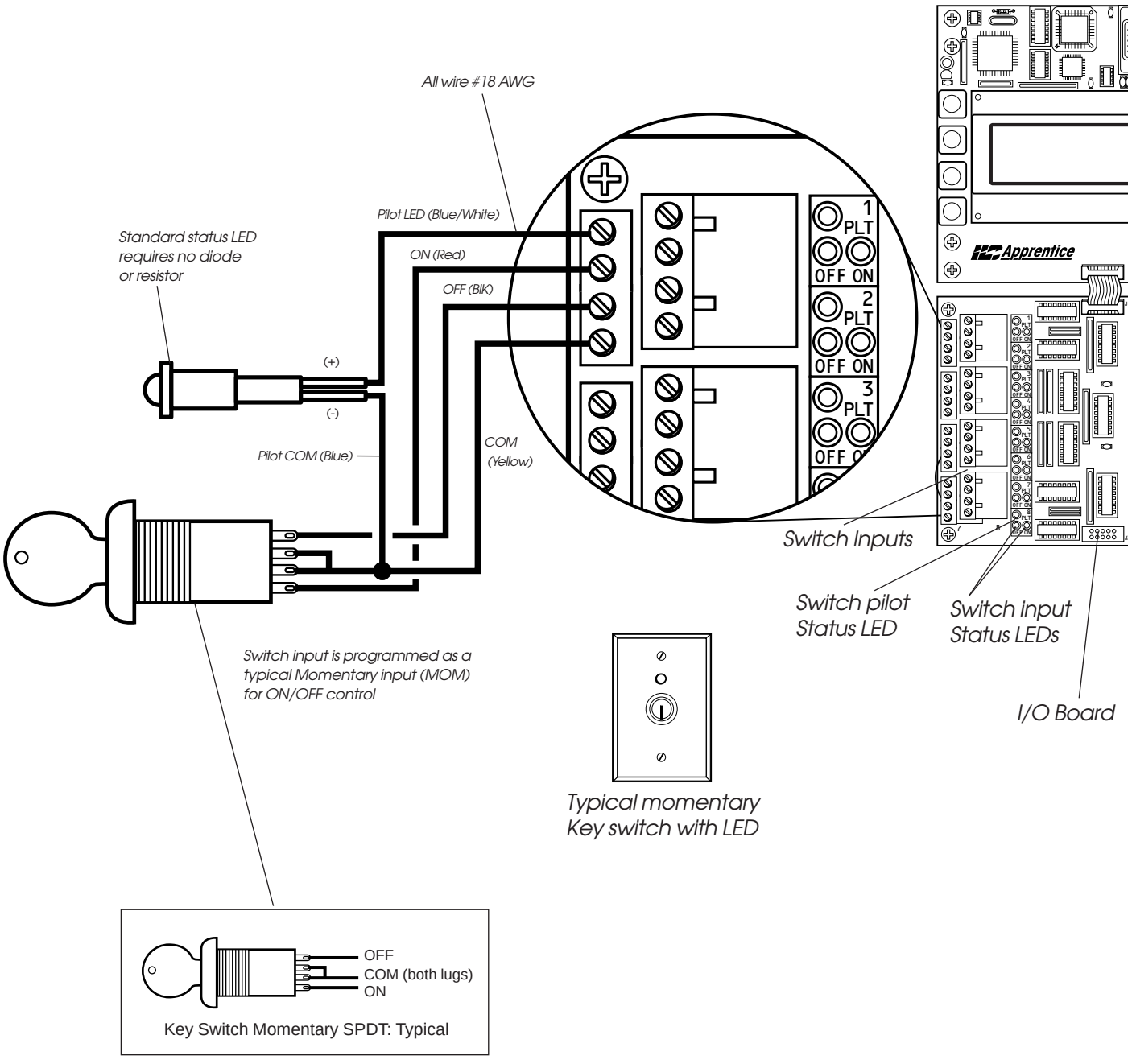
Momentary Key Switch Installation



Typical Momentary 3-wire ON/OFF Key Switch Wiring

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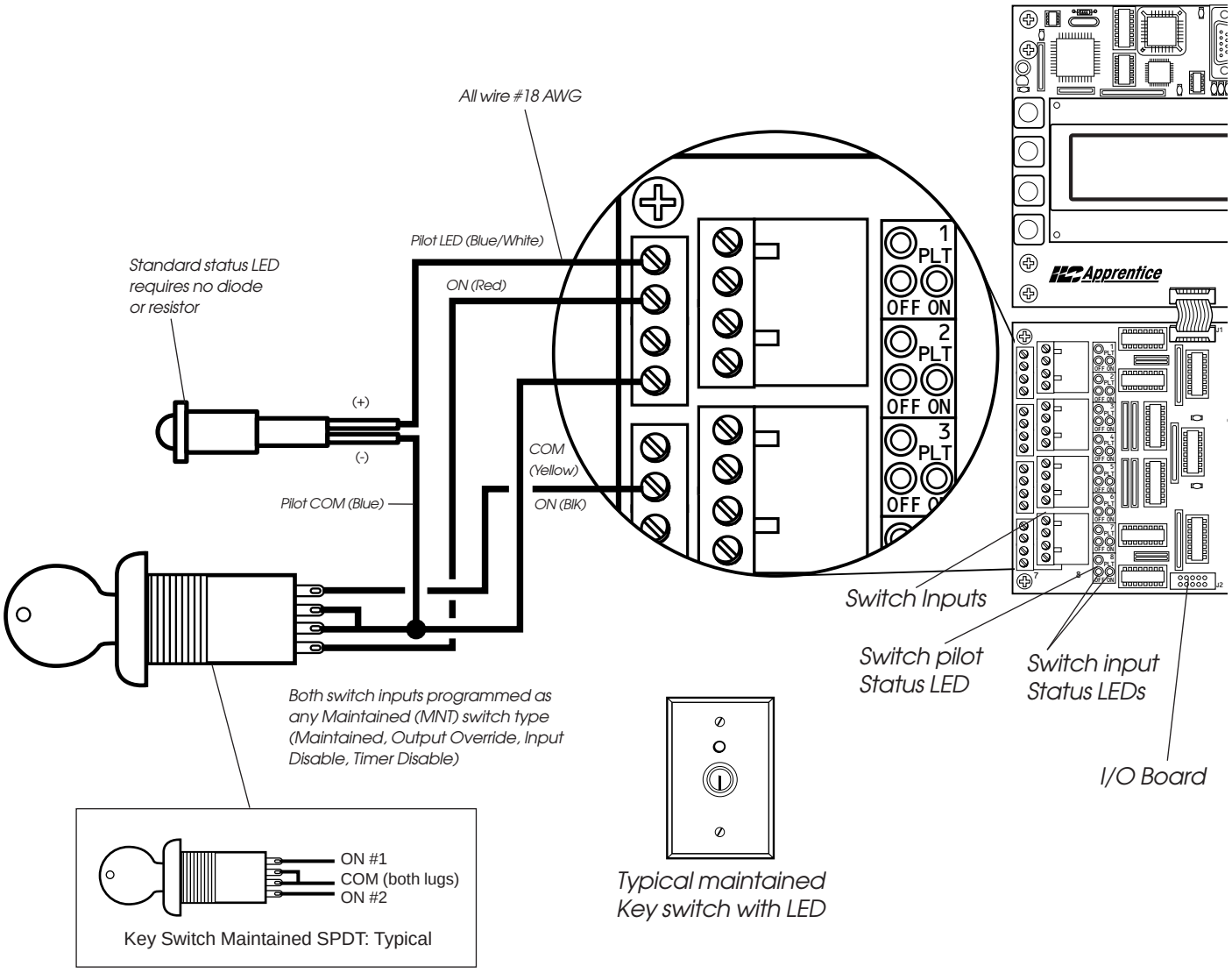
Maintained 3-position Key Switch Installation



Typical Maintained 3-position (3-Wire) Key Switch Operation:

ON/Auto/OFF
Use your key switch with the ILC LightMaster's *Output Override* function to override a relay or group of relays ON or OFF with a key. When the key is set to center Auto position, then other devices such as timers or a photocell may operate the relays. This application is similar to typical ON/Auto/OFF operation provided on many contactors.

Normal School/Summer School
Use your key switch with the ILC LightMaster's *Timer Disable* function to change the ON/OFF timer schedule operation from a "normal" school schedule to a "summer" schedule with the flip of a key switch.

Disable/Auto/ON Override
Use your key switch with the ILC LightMaster's *Input Disable* and *Output Override* programming options to Disable a photocell input. Set the key switch to AUTO and allow normal photocell operation or set the key to ON OVERRIDE to lock lighting ON.

Typical 3-position Maintained Key Switch Wiring

Energy Saving Lighting Controls

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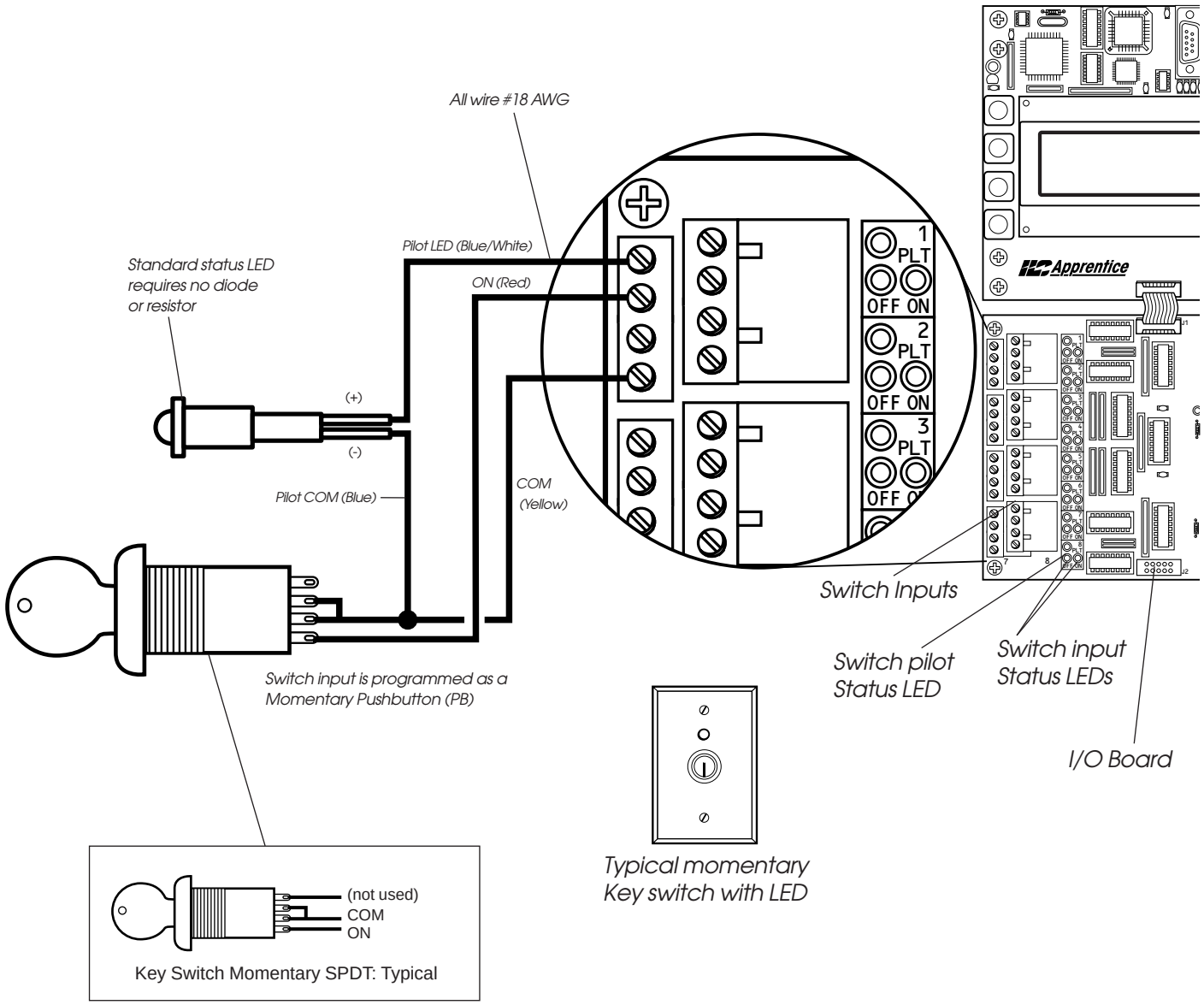
Momentary Key Switch (2-wire) Installation



Typical Momentary ON/OFF 2-Wire Key Switch Operation:

Key Switch is wired and programmed as a Momentary Pushbutton (MOM PB). Typical programming options are:

- Pushbutton ON/OFF control
- Set Preset
- 2-step Group and 4-step Group

Typical Momentary Key Switch 2-Wire Wiring

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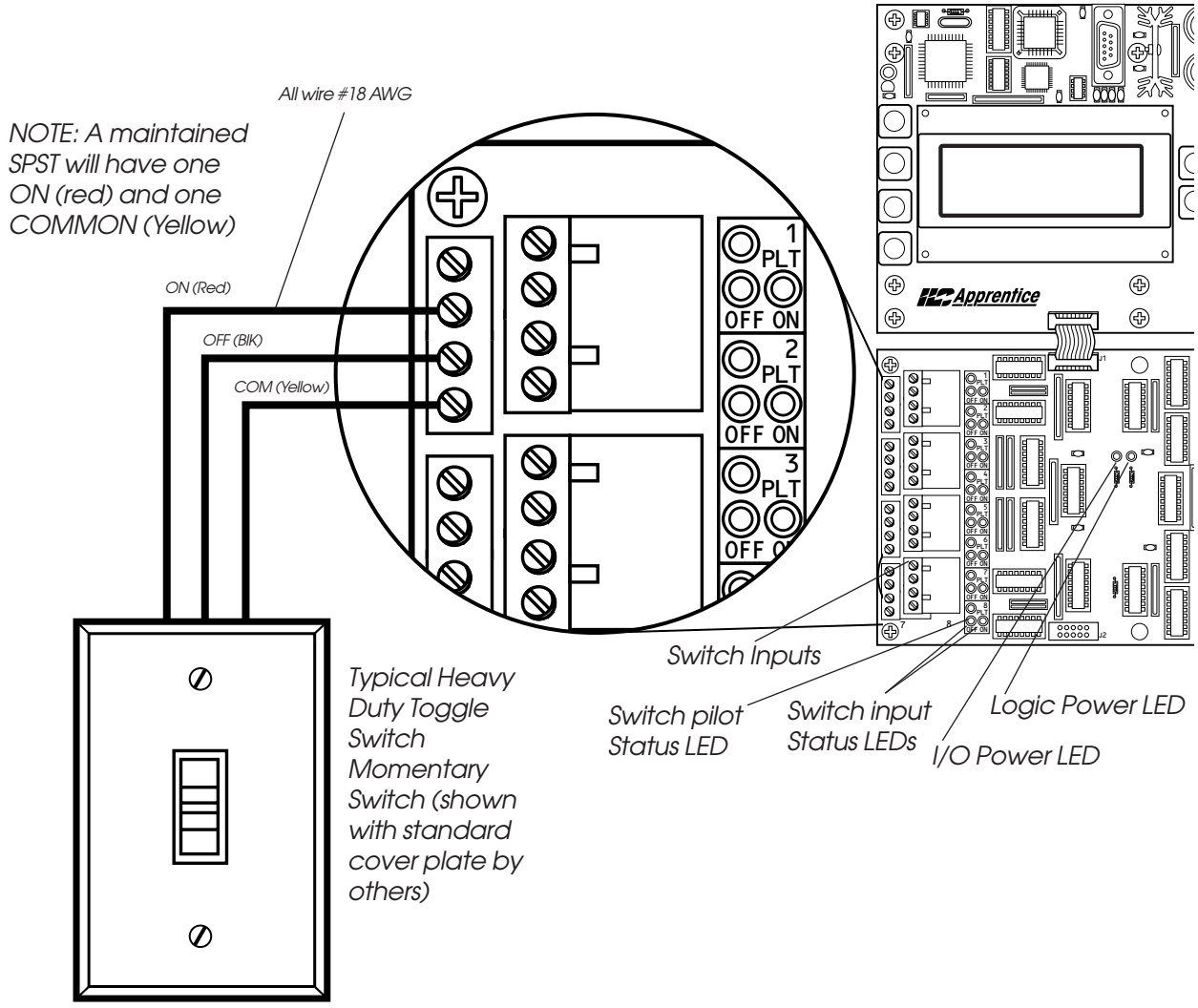
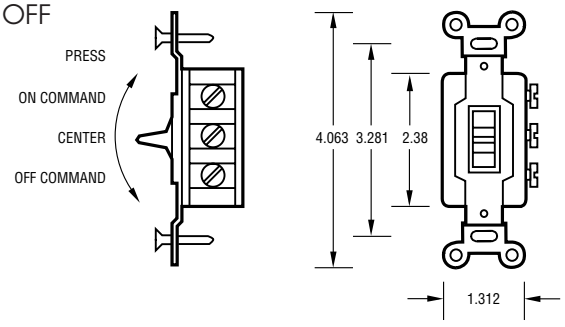
Heavy Duty Toggle Switch Installation



Typical for Momentary SPDT or DPDT center OFF Heavy Duty Toggle Switch.

Pass & Seymour #12501, 12511
Hubbell #1556, 1557
Leviton #1256, 1257 or equivalent



Typical Heavy Duty Momentary Switch Wiring

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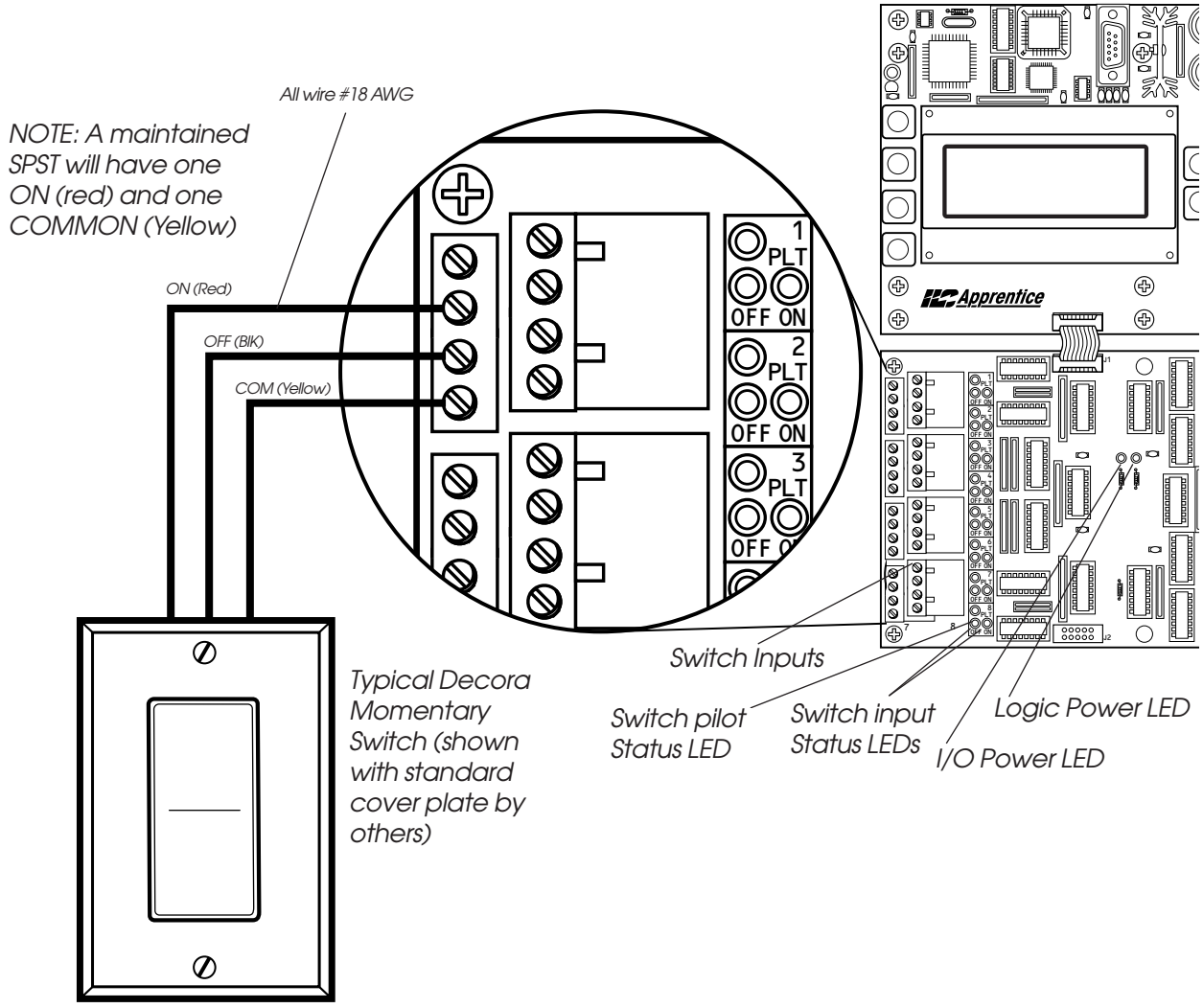
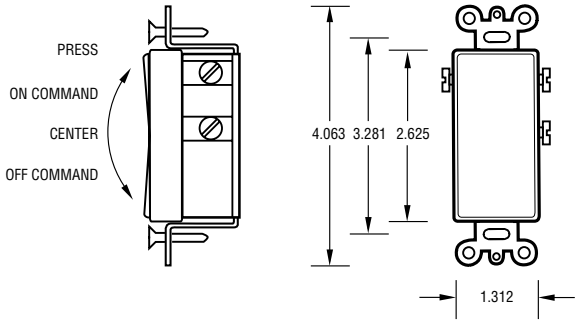
Decora® Momentary Switch Installation



Typical for Momentary SPDT or DPDT center OFF Decora Switch.

Leviton #5627 or equivalent



Decora Momentary Switch Wiring

Energy Saving Lighting Controls

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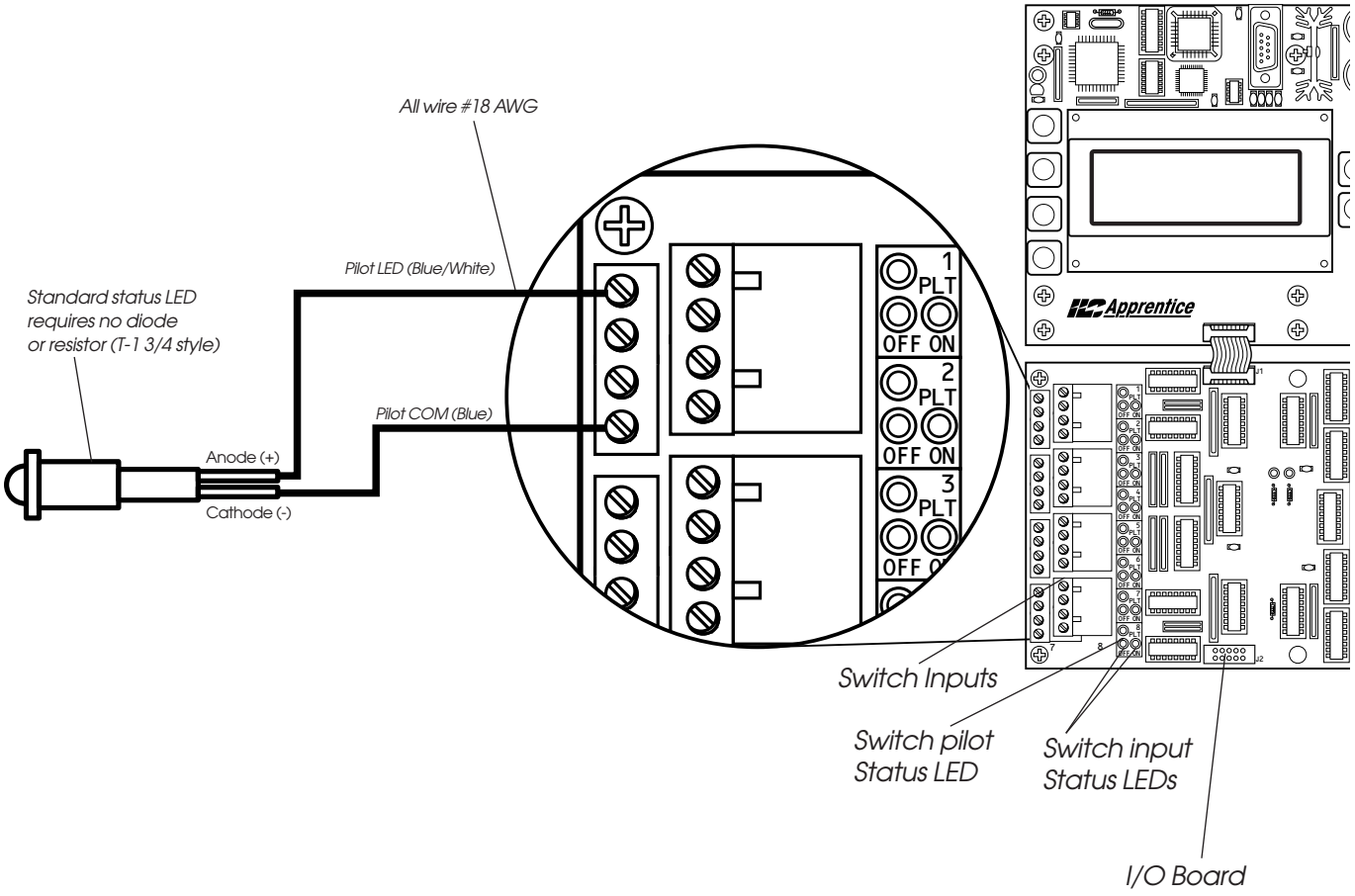
Status LED Installation



Typical Status LED Wiring

Energy Saving Lighting Controls

INTELLIGENT LIGHTING CONTROLS, INC.

5229 Edina Industrial Boulevard
Minneapolis. Minnesota 55439
Phone 952 829 1900
FAX 952 829 1901
www.ilc-usa.com

LIGHTING CONTROL

Relay Panel Schedule

Panel _____

RELAY	VOLTAGE	CIRCUIT	LOAD/AREA CONTROLLED	COMMENTS
1				
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Timer Definitions

TIMER	DESCRIPTION/COMMENT
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Switch Definitions

SWITCH	SWITCH TYPE	DESCRIPTION/COMMENT
1		
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12		
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