HUGHEY & PHILLIPS, LLC.

Installation and Operation Guide

HORIZON™ MEDIUM INTENSITY

DUAL LED LIGHTING SYSTEM

CONTROLLER

FAA TYPES A1, D1, & E1

MANUAL EPM-00000044-001

Revision 'F'

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** PATENTS PENDING

REVISIONS

REV	DATE	ECO	COMMENT
-	3/7/13		Initial Release
A	4/16/13	183	Update pages 15 - 19
B	2/4/14	197	Added 240VAC Information & Parts List
C	3/27/14	289	Text Corrections
D	6/5/14	307	Updated to correct Alarm Card changes
E	9/19/14	343	Updated for uniformity with other manuals
F	2/11/16	464	Updated to correct alarm card calibration procedure

WARRANTY POLICY

FOR CURRENT WARRANTY POLICY
PLEASE VISIT WWW.HUGHEYANDPHILLIPS.COM

TABLE OF HORIZON™ STANDARD SYSTEMS

MODEL NUMBER	INPUT VOLTAGE	HZ	DESCRIPTION
70-0001-001	120VAC	50/60	L-864/865 LED, MI DUAL, FAA TYPE E1
70-0001-003	120VAC	50/60	L-864 LED, MI RED, FAA TYPE A1
70-0001-005	120VAC	50/60	L-865 LED, MI WHITE, FAA TYPE D1
70-0001-011	240VAC	50/60	L-864/865 LED, MI DUAL, FAA TYPE E1
70-0001-013	240VAC	50/60	L-864 LED, MI RED, FAA TYPE A1
70-0001-015	240VAC	50/60	L-865 LED, MI WHITE, FAA TYPE D1

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GENERAL INFORMATION

The ‘70’ Series LED Lighting Controller is a state of the art digitally driven tower lighting control. It is designed to meet or exceed FAA specifications and deliver a high degree of fail-safe service. The modular design incorporated eases servicing and troubleshooting. The controller is capable of controlling one HORIZON™ LED-type Medium Intensity beacon and up to four HORIZON™ LED-type L-810 sidelights and features the following:

- Automatic photocontrol of the tower lights turn ON before Northern ambient skylight drops below 35 foot-candles and turn OFF before Northern ambient skylight rises above 60 foot-candles in accordance with FAA specifications.
- Manual Photocontrol switch to override the automatic photocontrol.
- Lightning protection by Metal Oxide Varistors (MOVs) on inbound and outbound lines.
- Fuse protection on outbound tower lines.
- Fuse protection of on-board DC power supply.
- Alarm in the event of a power fail to the control or the on-board DC power supply.
- Alarm for failure of each LED beacon.
- Alarm for failure of one or more sidelights per level.
- Signal indicating the control has turned the tower lights ON in the evening.
- Both normally open and normally closed independent alarm contacts for all aforementioned alarms.
- Independent auxiliary set of alarm contacts for all aforementioned alarms with NO and NC available.
- Latch Alarm for indication of Red LED failure in FAA Type L-864/865 Dual unit, 50-0005-001.
- Local status indicators for all alarms by means of bi-color red/green LEDs.
- Automatic restoration of alarms after a power failure.
- Indoor/outdoor NEMA 4 housing.
- Torroidal current sensing for isolation of tower lines from sensing circuitry.
- User programmable dip switches or potentiometer for light outages and troubleshooting aid.
- Failsafe alarms such that failure of any component in an alarm circuit will result in an alarm condition.

This control is capable of operating in adverse climatic conditions. However, care should be taken during installation to avoid any physical damage to the unit that may impair nominal operation. The following sections of this manual will review the installation of the control, the theory of operation, testing, and troubleshooting. It is highly recommended that these sections be studied before proceeding with the installation of the unit.

SAFETY PRECAUTIONS

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of this equipment. HUGHEY & PHILLIPS assumes no liability for the customer's failure to comply with these requirements, as listed below.

1. Any interruption of the protective grounding conductor (inside or outside the instrument) or disconnecting the protective earth ground terminal is likely to make this equipment dangerous. Intentional interruption is prohibited.

2. Whenever it is likely that the ground protection has been impaired, the equipment must be made inoperative by removing AC line power, and then shall be secured against any unintended operation.

3. Ensure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

4. Electrical energy available at many points may result in personal injury if touched. Any adjustment, maintenance, and repair of the opened equipment while power is applied shall be avoided as much as possible, however some maintenance described in this manual is performed with power supplied to the equipment while protective covers are removed. When repair with power applied is unavoidable, maintenance shall be carried out only by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

5. Do not install substitute parts or perform any unauthorized modification to the equipment.

1.0 INSTALLATION PROCEDURE

Installation of the 70 Series controller consists of the following steps: the housing installation, the tower and input power wiring, the photocell housing installation, the photocell wiring, and the alarm wiring. It is recommended that the following sections be read before proceeding with the installation as incorrect wiring could lead to severe damage to the control.

1.1 Housing Installation

The control is enclosed in a NEMA 4 housing. This allows the control to be mounted in any convenient location indoors or outdoors. Also, there are no position sensitive components on-board the control. This permits mounting in any orientation desired. Standard orientation is such that the internal labeling is readable from left to right.

Once a location and orientation have been decided upon, the control should be mounted to the wall by means of suitable wall fasteners. The fasteners should be inserted into all four mounting holes to insure secure installation, bearing in mind adverse conditions (e.g. earthquakes, severe storms, etc.) that may loosen the control off the supports or knock it off the wall.

Conduit or cable entrance holes and sizes are to be determined at site by installer.

1.2 Tower Wiring

For beacon wiring color codes, please see HORIZON™ beacon manual, EPM-00000043-001 provided with beacons.

The tower wires are connected to terminal block **TB1.**

The **Tower Neutral** wire connects to the terminal labeled **"N"**.
The **Beacon** line connects to the terminal labeled **"B"**.
The **Sidelight** (aka Obstruction Light) line connects to the terminal labeled **"O"**.
The **Beacon Mode** signal connects to the terminal labeled **"M"**.

1.3 Input Power Wiring

The input power wires connect to terminal block **TB1.**

The **Line** wire connects to the terminal labeled **"L"**.
The **Neutral** wire connects to the terminal block labeled **"N"**.
The **Ground** wire connects to the terminal labeled **"G"**.

The required input power is **120VAC** or **240VAC** at **50/60Hz** with **150VA,** three wires. The minimum breaker size is **5 Amps.** The recommended **Ground** wire size is **12 AWG**.

1.4 Photocell Housing

The photocell housing (part number PA446F21BS) should be mounted outdoors facing the Northern sky. A 21-foot photocell cable is supplied with the lighting control. The length of this cable is not critical and may extend up to 250 feet without affecting the operation of the control. Near-by obstructions to the North should be avoided even if it requires turning the photocell several degrees away from the North.

Direct rays of sunlight should not be permitted to reach the face of the photocell, and exposure to artificial illumination (such as floodlights, street lights, headlights, etc.) of more than a few foot-candles must be avoided in order to prevent undesired mode change of the tower lights. However, the photocontrol circuitry has a small delay built in to avoid changing modes in the event of a flash of light hitting the photocell.

1.5 Photocell Wiring

The photocell wiring connects to terminal block **TB1**.

The **Black Photocell** lead connects to the terminal labeled **"B"**.
The **Red Photocell** lead connects to the terminal labeled **"R"**.

As stated previously, the photocell wires extend 21 feet and can be extended further if it is necessary without affecting the function of the control.

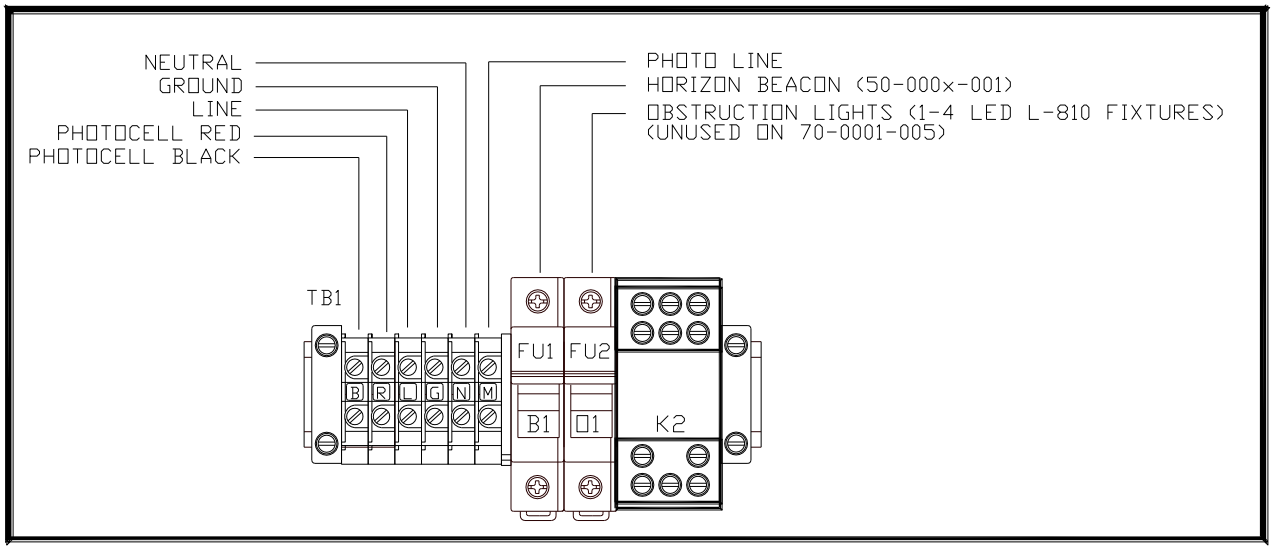

Figure 1 – TB1 Connections

1.6 Alarm Wiring

The alarm wiring connects to the different cards on-board the control. The alarm wiring can be connected in various ways depending on the customer's choice or needs. The different status indicators all have separate return lines. This enables the user to connect to the alarms individually.

If the user needs a common return for all alarms, a jumper can be tied among all the indicator returns. For example, connecting several normally open contacts in parallel will result in a contact closure in the case of an alarm condition. Likewise, connecting several normally closed contacts in series will result in a contact opening in the case of an alarm condition.

1.7 System Start Up

Before starting the system up, it is *highly* recommended section **2.0 THEORY OF OPERATION** is read. Subsequently, section **3.0 SYSTEM START UP AND TESTING** will guide the operator through a startup procedure to verify proper operation of the controller.

2.0 THEORY OF OPERATION

The control unit consists of two printed circuit boards, one double pole double throw mechanical relay, one latching relay and one switch. The two printed circuit boards are the Master Card (part number B7C14PAA (120VAC) or B7C19PAA (240VAC)) and the Alarm Card (part number B7C21LAA-001).

2.1 Master Card Operation

The Master Card is the central piece to the controller performing numerous functions simultaneously.

2.1.1 Master Card Power Supply

The Master Card power supply produces the regulated 12VDC used by the system.

In the event of a short circuit on any printed circuit board, fuse F1 will blow to protect the power supply and the circuitry associated with the short. Loss of the fuse will cause an alarm condition.

Relay K1 is connected to VCC and ground and will energize so long as power is present. LED1 will be green so long as power is present.

2.1.2 Master Card Photocontrol

The photocontrol is active with the panel switch SW1 in the **Auto** position.

As the ambient light rises, the resistance of the photocell will drop until it reaches about 500 Ω in the daytime. Potentiometer R7 is used to adjust the input voltage, but has been factory calibrated and should not be normally adjusted.

In night mode, LED3 will be red. In day mode, LED3 will be green. Switch SW1 controls manual operation of DAY/NIGHT mode and disables Automatic mode.

2.1.3 Master Card Redlight Lockout

The Master Card performs alarm lockout functions such that during daytime conditions, no failures are reported for RED only systems. WHITE and DUAL lighting systems will not utilize the Redlight Lockout circuit. The lockout signal will be 0 VDC during day mode and 12 VDC during night mode.

2.2 Alarm Card Operation

Alarming of the tower lights is done by the Alarm Card. The card uses current sense transformers to sense the current going through the conductor to the beacon or sidelights. This provides isolation from the tower lines in the event of a surge or lightning strike.

2.2.1 Beacon Alarm

Channel 1 on the Alarm Card is used to monitor the beacon status. The beacon line passes through the current transformer CS1.

The potentiometer on SW1 is used to calibrate the level of current draw that triggers a beacon alarm. A tutorial on doing this is located in section 3.3.1.

2.2.2 Sidelight Alarm

Channel 2 on the Alarm Card is used to monitor the obstruction light status. The sidelight line passes through the current transformer CS2.

In the case of two OB lights, position 2 on SW2 would set the trip level to alarm for a failure of either OB light.

If there are more than two sidelights present, then the appropriate switch position on SW2 should be ON (e.g. position 3 for 3 sidelights, position 4 for 4 sidelights).

One and only one DIP switch position is to be on. The DIP switch to be on is typically the same number of sidelights on the circuit. If it is desired to set the alarm threshold to be less sensitive, then the next lower switch cam be used.

If it is desired to alarm the sidelight channel to report after multiple lights have failed then a different switch ON position will be needed.

In summary, if the user wishes to alarm **(X)** lights out of **(Y)** lights total, position **(Y-X+1)** on SW2 should be ON.

Example: **4** sidelights on the level. Wish to alarm when **2** lights go out. **Y=4, X=2.** Position ON = **(Y-X+1)**=(4-2+1)=**3.**

Position **3** on SW2 should be ON to alarm 2 lights out of 4 going out. Only one position should be in the ON position.

2.3 Alarm Relay Latch Operation

For controllers using the HORIZON™ Dual Medium Intensity LED fixture (50-0005-001), the latching relay (K2) is used to provide a latching alarm contact upon failure of the L-864 portion of fixture. Per FAA requirements, upon failure of the L-864, the L-865 should energize and provide proper light output of 2,000 candela.

If the red section should fail, the internal circuitry of the HORIZON™ fixture will turn off for 30 seconds to allow the beacon alarm to be recognized by the controller. This alarm will latch relay K2 and provide an alarm contact at TBA. The alarm on the Alarm Card will clear once the unit switches into the L-865 night mode at 2000 candela.

The latched relay will stay energized until the photocell switches the controller into DAY mode or the SW1 switch is placed into DAY mode.

2.4 Panel Operation

2.4.1 Nighttime Operation

When the panel switch SW1 is in Auto position and the photocell senses lower light conditions, the Master Card will change modes from day to night. During the mode change, an alarm lockout signal will be present on the RLO terminal. This signal will last approximately 5 seconds as the mode transition is made. The Master Card will signal relay K1 to energize. Relay K1 will power the sidelights and provide MODE signal to TB1-M.

The Alarm Card checks for proper current draws on the power lines to detect light failures. The Master Card should have Photo Mode LED3 red and Power Fail LED1 green. Alarm Card LEDs should also be green.

2.4.2 Daytime Operation

When the panel switch SW1 is in the Auto position and the photocell senses higher light levels, the Master Card will switch to Day mode. The Photo Signal (PH) will de-energize relay K1 turning the sidelights OFF. On a red lighting system, the mode signal will go to 0 VAC and turn off the L-864 beacon. If the system is operating with an L-865 beacon, the 0 VAC mode signal will place the fixture in Day Intensity of 20,000 candela.

The timer on-board the Master Card will shut down. The Master Card will also output a constant lockout signal (RLO) to lockout the sidelight alarm. All LEDs should be green. In daytime operation

there should be no alarms on a FAA Type A system. If operating an L-865 beacon during Day, the beacon alarm will still provide alarm status of failure.

2.5 Alarm Operation

The controller provides dry contact alarms for various failures in the control or tower lights. These dry contacts, accessed through screw terminal blocks, are available from the poles of the different alarm relays on the various printed circuit boards. **The alarm contacts are rated at 300mA at 120VAC.** Exceeding this rating is **NOT** recommended as the alarm relays could suffer physical damage. The alarm terminal blocks are labeled on the boards, and have six connections available.

Primary Alarm Contacts: The first set of three connections is the primary alarm contacts. C1 is the primary Common terminal. NC1 is the primary Normally Closed (open on failure) terminal. NO1 is the primary Normally Open (closure on failure) terminal.

Auxiliary Alarm Contacts: The auxiliary alarm contacts are duplicates of the primary contacts. C2 is the Auxiliary Common. NC2 is the Auxiliary Normally Closed. NO2 is the Auxiliary Normally Open.

The control is designed to alarm for the following reasons:

- Power Failure
- Photocell Mode Status
- Beacon Failure
- Sidelight Failure

2.5.1 Power Failure

The power fail alarm connections are located on the Master Card at terminal blocks TB2 and TB3 labeled **POWER FAIL ALARM.** The primary alarm connections are accessed through TB2 terminals C1, NC1, and NO1. The auxiliary alarm connections are accessed through TB3 terminals C2, NC2, and NO2. An alarm will be reported if power is lost to the control or fuse F1 blows on the Master Card due to a DC short circuit. LED1 on the Master Card will be green during normal operation.

2.5.2 Photocell Mode

The photo mode alarm connections are located on the Master Card at terminal blocks TB5 and TB6 labeled **PHOTO MODE.** The primary alarm connections are accessed through TB5 terminals C1, NC1, and NO1. The auxiliary alarm connections are accessed through TB6 terminals C2, NC2, and NO2. During night mode the Nominally Closed (NC) terminals will have the closure to Common (C). During day mode the Nominally Open (NO) terminals will have the closure to Common (C). LED3 on the Master Card will be lit red in night mode and green in day mode.

2.5.3 Beacon Failure

The beacon failure alarm connections are located on the Alarm Card at terminal blocks TB3 and TB4 labeled **BEACON.** The primary alarm connections are accessed through TB3 terminals C1, NC1, and NO1. The auxiliary alarm connections are accessed through TB4 terminals C2, NC2, and NO2. An alarm will be reported if a beacon failure occurs.

2.5.4 Sidelight Failure

The sidelight failure alarm connections are located on the Alarm Card at terminal blocks TB5 and TB6 labeled **OBS LITE.** The primary alarm connections are accessed through TB5 terminals C1, NC1, and NO1. The auxiliary alarm connections are accessed through TB6 terminals C2, NC2, and NO2. An alarm will be reported if a failure occurs on the sidelight level. (See 2.2.2 for details on sidelight failure settings.) LED2 on the Alarm Card will be red if a failure occurs. Otherwise, it will be green in both night and day mode.

2.6 Circuit Protection

The controller has two forms of circuit protection available. The first form is surge protection on in bound and out bound lines. The second form is against short circuits.

2.6.1 Surge protection

Surge protection is accomplished by Metal Oxide Varistors (MOVs) tied between the out bound or in-bound lines and ground. In the event of a surge on one of the lines, the MOV will act as a short to ground and suppress the surge. If the surge is of sufficient duration, the shorting MOV will trip the outbound line breaker. With higher surges the MOV may blow as it shorts the surge to ground (i.e. lightning surges). In the event of nearby electrical storms, a maintenance check should be done to insure all lines still have capable MOVs for future surge activity.

2.6.2 Short circuit protection

Short circuit protection is accomplished on out-bound lines by fuses FU1 and FU2. These fuses protect the beacon and sidelight lines respectively. In the event of a short on any of these two lines, the appropriate fuse will open and shut down the line. In the case of a beacon or sidelight line short, the Alarm Card will detect the loss of current. An alarm will be signaled to reflect the lights out condition.

The Master Card utilizes fuse F1 to protect against DC shorts on the printed circuit boards. In the event of a DC short, fuse F1 will blow shutting down all cards. Alarms will be reported by way of the Normally Closed contact which will open.

3.0 SYSTEM START UP AND TESTING

Once the control is mounted, secured, and wired as described in section 1.0, the following start up procedure should be followed. This procedure will allow the user to verify proper operation of the control's functions. In the event a problem occurs, refer to section 4.0 TROUBLESHOOTING.

3.1 Power-Up and Day Mode Verification

Before applying power to the control, check circuit breakers CB1 and CB2 to insure they are in the ON (up) position. The mode switch SW1 should be in Day Mode on start up. Apply power to the control. The control will immediately switch to daytime operation. All LED status indicators should be green. All alarms relays should be in the energized position except the Photo Mode alarm. The Photo Mode alarm relay should be in the de-energized position.

For FAA Type A-1 systems, all the tower lights should be OFF.

For FAA Type D-1 or E-1 systems, the white L-865 should be flashing in DAY mode (20,000 candela) and the sidelights should be OFF.

3.2 Night Mode Verification

Switch panel mode switch SW1 to Night mode. The control should switch to night time operation. The Photo Mode LED on the Master Card should now be red indicating night mode operation. The Mode alarm will now be in the Nominally Closed position. All other LEDs should be green.

For FAA Type A-1 or E-1 systems, the red L-810 sidelights and L-864 beacon should be ON.

For FAA Type D-1, the white L-865 beacon should be ON, flashing in NIGHT Mode (2,000 candela).

3.3 Alarm Verification

Once night time operation has been verified, the following tests will verify proper operation of the alarm circuits.

3.3.1 Beacon Failure

Beacon channels on the alarm card are pre-calibrated at the factory. However, if field conditions are different, adjustment may be needed. The following procedure may be followed to calibrate a beacon alarm channel in the field.

3.3.1.1 Beacon Channel Calibration

Switch the beacon into night mode. *Carefully*, without touching any other elements of the circuit, adjust the potentiometer (POT) as follows.

If the alarm LED is currently green, *slowly* adjust the POT counter-clockwise until the alarm LED turns red intermittently.

If the alarm LED is currently red, *slowly* adjust the POT clockwise until the alarm LED turns green intermittently.

After this pot adjustment, the LED should toggle between red and green roughly every half second.

Adjust the potentiometer clockwise **four (4) full turns**.

Wait three (3) minutes and ensure the LED remains green the entire time and does not toggle between green and red. If it stays green the entire time then the calibration process is complete.

If the LED did not remain steady green, then repeat steps one through three of this calibration but add an extra turn in step two for a total of five (5) turns.

3.3.2 Sidelight Failure

After setting SW2 on the Alarm Card, the Sidelight Alarm should be tested. With the control in night mode, pull out the sidelight fuse at FU2. After about 20 seconds the Sidelight Alarm LED will go red indicating an sidelight failure. The alarm contacts should be closed. Replace the fuse and the sidelight failure alarm should clear and the LED should go green again in about 20 seconds.

3.4 Photocell Verification

To test the photocell for proper operation, first the control must be in the Auto mode. Switch mode switch SW1 to the Auto mode position. The control will now turn the lights ON and OFF according to the light intensity hitting the photocell. Simulate night mode by covering the outdoor photocell so no light hits the faceplate. The control should go into night mode operation.

Simulate day mode by allowing light to shine on the photocell. The control should switch to day mode operation. If the control does not go to day mode, use a flashlight or turn the photocell several degrees away from the North to allow more light to hit the faceplate. Once day mode operation via the photocell has been verified make sure the photocell is turned back to its original position facing the Northern sky.

4.0 TROUBLESHOOTING

This section is provided to assist the customer in identifying the source of problems that may occur to the control. Upon verifying the problem the customer should look under the appropriate heading for troubleshooting assistance.

WARNING

1. Always turn off power when changing any component or printed circuit board.

2. The components and assemblies in this system were designed by HUGHEY & PHILLIPS. HUGHEY & PHILLIPS strongly recommends against substituting components or assemblies which may be available through other vendors.

4.1 Problem: No Lights, All Alarms Present

Possible Cause: No power being applied to control.

Diagnostic Test: Check incoming power for 120VAC or 240VAC, 50/60Hz at 150VA.

Corrective Action: Apply Power to control.

4.2 Problem: Power Fail Alarm

Possible Cause: Fuse F1 on Master Card blown.

Diagnostic Test: Visually inspect for signs of short circuit on all printed circuit boards.

Corrective Action: Once the card with the short has been isolated, inspect for shorts and repair or replace card. Replace F1.

4.3 Problem: Red Lights on in Daytime, or White Unit in Night Mode during Day

4.3.1 Possible Cause 1

Possible Cause: Mode switch SW1 in Night Mode.

Diagnostic Test: Check position of Mode Switch SW1.

Corrective Action: Put SW1 in Auto mode position.

4.3.2 Possible Cause 2

Possible Cause: Photocell Malfunctioning.

Diagnostic Test: Switch SW1 to Day Mode. If lights turn off or go into day mode then the photocell is malfunctioning.

Corrective Action: Replace Photocell.

4.3.3 Possible Cause 3

Possible Cause: Master Card Photocircuitry Failure.

Diagnostic Test: Switch the control to Day Mode. If lights remain on in night mode then the Master Card is malfunctioning.

Corrective Action: Replace faulty Master Card.

4.4 Problem: Beacon Fail Alarm

4.4.1 Possible Cause 1

Possible Cause: Fuse FU1 open.

Diagnostic Test: Turn control OFF. Check for shorts on beacon line up the tower. Check for blown MOVs due to lightning activity. Blown MOVs may appear burnt or blackened.

Corrective Action: Repair shorts on beacon line. Replace blown MOVs. Replace fuse.

4.4.2 Possible Cause 2

Possible Cause: Beacon out.

Diagnostic Test: Verify 120V or 240V AC on Beacon line. Switch controller to DAY mode to verify if unit will operate in DAY intensity.

Corrective Action: Replace beacon.

4.4.3 Possible Cause 3

Possible Cause: Alarming circuitry malfunctioning

Diagnostic Test: Perform the procedure for verifying beacon alarms in section 3.3.1.

Corrective Action: Re-calibrate or replace Alarm Card.

4.4.4 Possible Cause 4

Possible Cause: LED Beacon failure

Diagnostic Test: Verify cycle of alarm condition every 15 minutes as LED beacon will operate for 15 minutes then fail for 30 seconds to generate alarm condition.

Corrective Action: Replace faulty LED board(s).

4.5 Problem: Sidelight Fail Alarm

4.5.1 Possible Cause 1

Possible Cause: Fuse FU2 open.

Diagnostic Test: Turn control OFF. Check for shorts on sidelight line up the tower. Check for blown MOVs due to lightning activity. Blown MOVs may appear burnt or blackened.

Corrective Action: Repair shorts on sidelight line. Replace blown MOVs. Replace FU2 fuse.

4.5.2 Possible Cause 2

Possible Cause: Sidelight out.

Diagnostic Test: With the control in night mode, change SW1 on the Alarm Card from the position ON it is in to position ON to the left (e.g. if position 2 is ON, switch position 1 ON instead. If one LED module is bad and all others on the level are good, then the Sidelight Alarm will clear and the LED on the Alarm Card will go green.

Corrective Action: Replace burned out sidelight.

4.5.3 Possible Cause 3

Possible Cause: Alarming circuitry malfunctioning

Diagnostic Test: With the control in night mode, check that SW2 has position ON corresponding to the number of LED modules on the line (see section 2.2.2). If SW2 does not have a position ON, an alarm will be reported.

Corrective Action: Replace faulty Alarm Card and switch SW2 to correct position ON.

5.0 REPLACEMENT PARTS LIST

The following lists include the Hughey & Phillips part numbers of components that are replaceable on the controller.

ITEM	H&P PART NUMBER	DESCRIPTION
K1	KA120DV2022C	RELAY, 12VDC COIL DPDT
K2	RLY0001	RELAY, LATCH, 12VDC COIL
MC (120V)	B7C14RAA	MASTER CARD/PHOTOCELL, 120V
MC (240V)	B7C19RAA	MASTER CARD/PHOTOCELL, 240V
AC	B7C21LAA-001	ALARM CARD, BCN-SL
MV1-3 (120V)	MV150LA20	MOV, 150V 20J
MV1-3 (240V)	MV250LA20A	MOV, 250V 20J
MV4	MV24ZA4	MOV, 24V 4J
FU1-2	DP-1020	FUSE, 4A
SW1	SZ22030251AK	SWITCH

6.0 APPENDIX OF DRAWINGS

The following is a list of the drawings included in the following pages of this manual.

DRAWING NUMBER	DESCRIPTION
70-0001	70-0001 SERIES ASSEMBLY
71-0002	70-0001 SERIES WIRING DIAGRAM
HACBA52C000	HOUSING, 12” x 10” x 5”, NEMA4

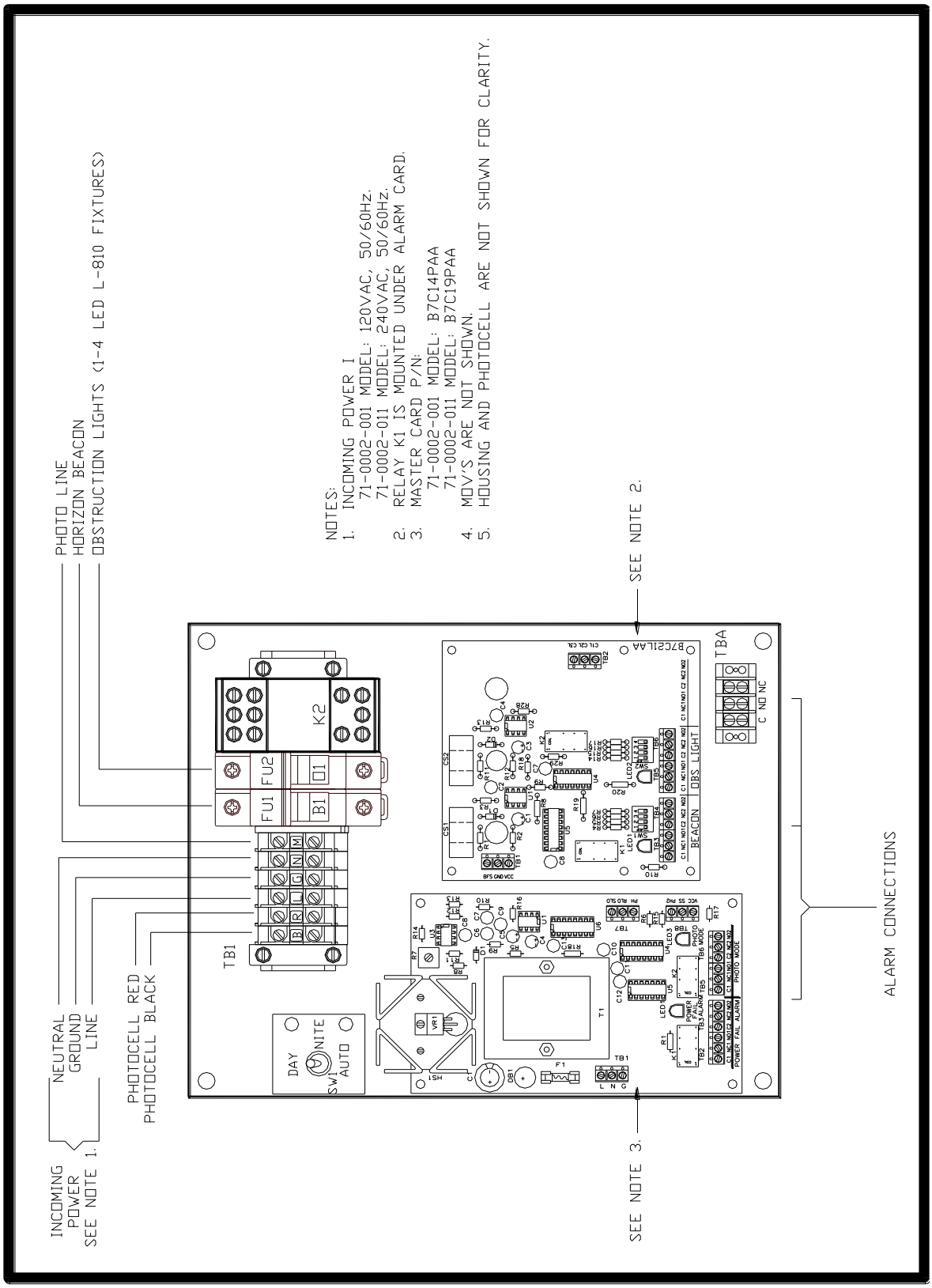

Figure 2 – 70-0001-0xx Panel Layout

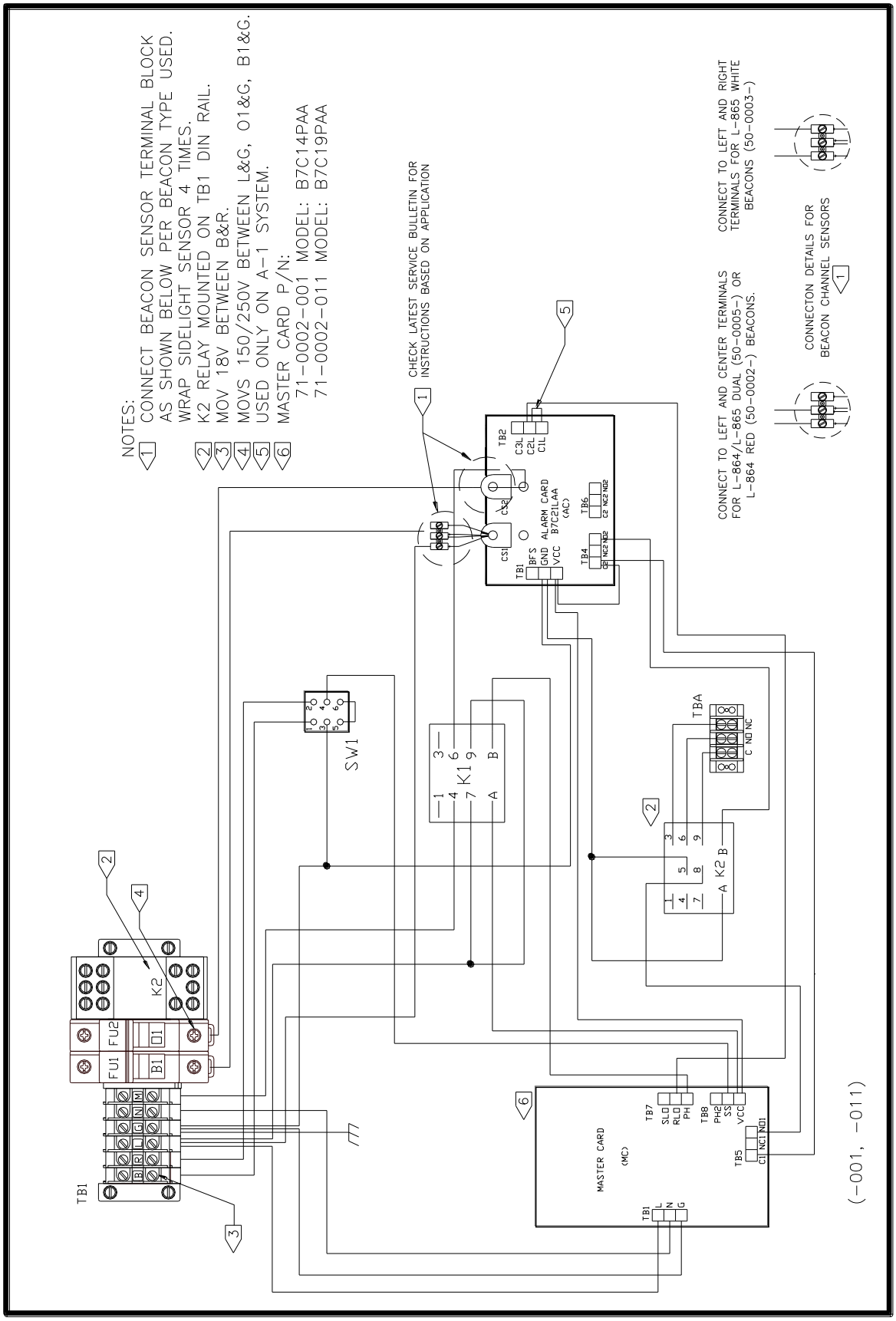

Figure 3 – Wiring Diagram

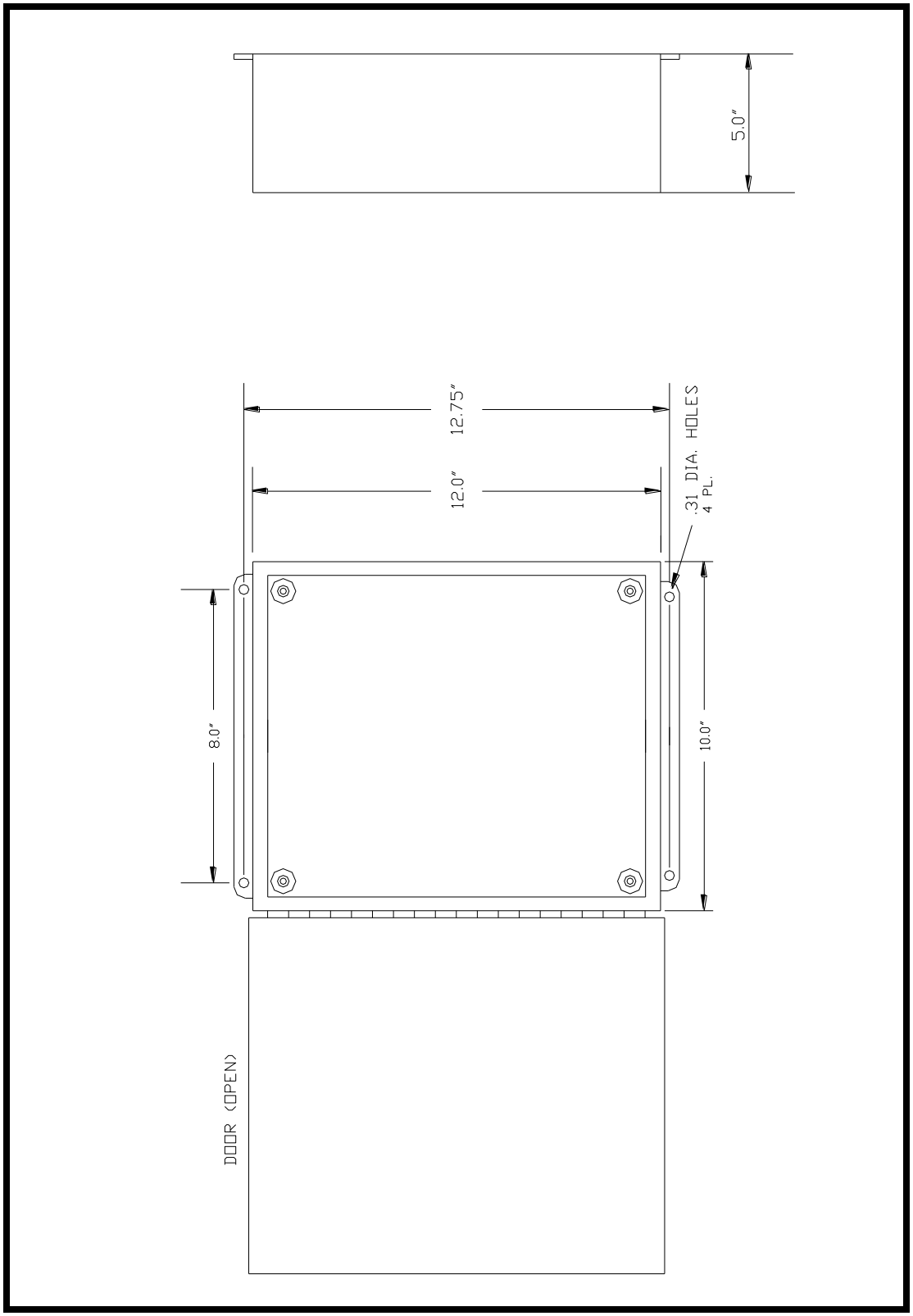

Figure 4 – Housing Dimensions