Honeywell

Installation and Operation Guide
for
Programmable Logic Controller
Health Monitoring System

Model 40002083

Manual Number EPM40002083-001

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HISTORY OF REVISIONS

Rev.	Comment	ECO#	Approved	Date
1	Preliminary			

NOTICE

The integrity and reliability of Honeywell airport lighting systems are dependent on the use of Honeywell parts and components. To ensure the optimum performance and reliability of your Honeywell system, it is strongly advised that only components and modules provided by Honeywell be used.

The following is Honeywell's standard Limited Warranty for Airport Systems Products ("Products"). This warranty applies unless a different warranty has been specifically agreed to and signed by Honeywell's authorized representative.

1.1   LIMITED WARRANTY

(a) "Nonconformance" means a defect in workmanship or material; a failure to comply with applicable Honeywell drawings; or a failure to comply with applicable FAA specifications. Normal wear and tear (including but not limited to incandescent lamp failure) or the need for periodic maintenance shall not constitute a Nonconformance.

(b) Honeywell warrants that at time of delivery to Buyer, its Products will comply with applicable Honeywell drawings and FAA specifications and will be free from defects in workmanship and material. These warranties shall run to Buyer, its successors and assigns. The duration of these warranties shall be as follows:
> (1) for non-LED-based obstruction lights, twenty-four (24) months after shipment of the Product;
> (2) for non-LED-based airfield lights and for Control and Monitoring Systems (excluding software and third-party components), twenty-four (24) months after shipment of the Product or twelve (12) months after date of first use, whichever occurs first;
> (3) for LED-based airfield and obstruction lights, five (5) years after shipment of the Product;
> (4) for Control and Monitoring System software developed by Honeywell, ninety (90) days from date of first use; and
> (5) for third party hardware and software components of Control and Monitoring Systems, in accordance with the warranty from the third party.

(c) Buyer must notify Honeywell in writing of a Nonconformance within the warranty period and return the Product to Honeywell within thirty (30) calendar days after such notice, in accordance with instructions which shall be issued by Honeywell. Honeywell's obligation and Buyer's remedy under this warranty is limited to either repair or replacement, at Honeywell's option, of the nonconforming Product. All Products repaired or replaced hereunder shall be warranted only for the unexpired portion of the original warranty period. Honeywell agrees to assume round trip transportation costs for a nonconforming Product in an amount not to exceed normal ground shipping charges to the warranty service facility designated by Honeywell. The risk of loss or damage to all Products in transit shall be borne by the Party initiating the transportation of such Products.

(d) Honeywell shall not be liable under this warranty if the Product has been exposed or subjected to (1) any maintenance, repair, installation, handling, transportation, storage, operation or use which is improper or otherwise is not in compliance with Honeywell's instructions; or (2) any alteration, modification or repair by anyone other than Honeywell or those specifically authorized in writing by Honeywell; or (3) any accident, contamination, foreign object damage, abuse, neglect or negligence after delivery to Buyer; or (4) any damage precipitated by failure of a Honeywell supplied Product not under warranty or by any product not supplied by Honeywell.

(e) THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN OR ORAL, EXPRESS, IMPLIED OR STATUTORY, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR NON-INFRINGEMENT, ALL OF WHICH ARE HEREBY EXPRESSLY DISCLAIMED. NO EXTENSION OR EXPANSION OF THIS WARRANTY SHALL BE BINDING UPON HONEYWELL UNLESS SET FORTH IN WRITING AND SIGNED BY HONEYWELL'S AUTHORIZED REPRESENTATIVE.

(f) IN NO EVENT SHALL HONEYWELL BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES UNDER THIS WARRANTY EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES INCLUDING, WITHOUT LIMITATION, INTERRUPTION OF BUSINESS, LOSS OF PROFITS, OR LOSS OF USE. THE EXCLUSION OF INCIDENTAL AND CONSEQUENTIAL DAMAGES AS SET FORTH IN THIS WARRANTY SHALL BE DEEMED INDEPENDENT OF, AND SHALL SURVIVE, ANY FAILURE OF THE ESSENTIAL PURPOSE OF ANY LIMITED REMEDY UNDER THE TERMS OF THIS WARRANTY

<u>DISCLAIMERS</u>

This manual could contain technical inaccuracies or typographical errors. Honeywell reserves the right to revise this manual from time to time of the contents thereof without obligation of Honeywell to notify any person of such revision or change. Details and values given in this manual are average values and have been compiled with care. They are not binding, however, and Honeywell disclaims any liability for damages or detriments suffered as a result of reliance on the information given herein or the use of product, processes or equipment to which this manual refers. No warranty is made that the use of the information or of the products processes or equipment to which this manual refers will not infringe any third party's patents or rights. The information given does not release the buyers from making their own experiments and tests.

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<u>TABLE OF FIGURES</u>

SAFETY INFORMATION

This section contains general safety instructions for using your Honeywell equipment. Task and equipment-specific Warnings are included in other sections of this manual where appropriate. Read all Warnings and follow all instructions carefully. Failure to do so may result in personal injury, death, or property damage. To use this equipment safely, refer to the following:

1. Refer to the FAA Advisory Circular *AC 150/5340-26, Maintenance of Airport Visual Aids Facilities*, for instructions on safety precautions.

2. Observe all safety regulations. To avoid injuries, always remove power prior to making any wire connections and/or touching any parts. Refer to FAA Advisory *Circular AC 150/5340-26*.

3. Read and become familiar with the general safety instructions provided in this section of the manual before installing, operating, maintaining, or repairing this equipment.

4. Read and carefully follow the instructions given throughout this manual before performing specific tasks and working with specific equipment.

5. Store this manual within easy reach of personnel installing, operating, maintaining, or repairing this equipment.

6. Follow all applicable safety procedures required by your company, industry standards, and government or other regulatory agencies.

7. Obtain and read Material Safety Data Sheets (MSDS) for all materials used.

SAFETY AND WORKMANSHIP ALERTS

This manual uses two types of markings when giving instructions requiring special attention. The markings will be followed by indented text:

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The WARNING sign in this manual denotes a hazard. The WARNING calls attention to a procedure or practice which, if not correctly performed or adhered to, could result in property damage, injury or death. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

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│     CAUTION     │
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Failure to obey the instructions following a CAUTION marking may result in equipment damage.

QUALIFIED PERSONNEL

The term "qualified personnel" is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance, and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations and have been trained to safely install, operate, maintain, and repair the equipment. It is the responsibility of the company operating this equipment to see that its personnel meet these requirements.

INTERLOCKS

This equipment contains interlocks for your protection. To ensure safety, always remove power from the equipment prior to opening access panels or doors if possible. Do not depend on the interlocks or door switches when working with the equipment. Do not short-circuit or tamper with any access gate, door or other safety interlock switch. Discharge capacitors with an approved insulated grounding rod prior to touching any part. When it is absolutely mandatory that an interlock be bypassed for the purpose of tracing or correcting a malfunction, authorized maintenance personnel may perform the bypass for the specific test to be made. Immediately after completing the test, restore the interlock to working condition.

<div style="border:2px solid black; text-align:center;">

WARNING!

</div>

INTENDED USE

HONEYWELL IS NOT RESPONSIBLE FOR INJURIES OR DAMAGES RESULTING FROM NONSTANDARD, UNINTENDED APPLICATIONS OF ITS EQUIPMENT. THIS EQUIPMENT IS DESIGNED AND INTENDED ONLY FOR THE PURPOSE DESCRIBED IN THIS MANUAL. USES NOT DESCRIBED IN THIS MANUAL ARE CONSIDERED UNINTENDED USES AND MAY RESULT IN SERIOUS PERSONAL INJURY, DEATH OR PROPERTY DAMAGE. UNINTENDED USES MAY RESULT FROM TAKING ANY OF THE ACTIONS LISTED BELOW.

1. **Making changes to the equipment that have not been recommended or described in this manual, or using parts that are not genuine Honeywell replacement parts.**

2. **Failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards.**

3. **Using materials or auxiliary equipment that are inappropriate or incompatible with your Honeywell equipment.**

4. **Allowing unqualified personnel to perform any task.**

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<u>KEEP AWAY FROM LIVE CIRCUITS.</u> OPERATION AND MAINTENANCE PERSONNEL MUST OBSERVE ALL SAFETY REGULATIONS AT ALL TIMES. DO NOT CHANGE PLUG-IN COMPONENTS OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH THE HIGH VOLTAGE SUPPLY ON. UNDER CERTAIN CONDITIONS, THERE IS A POTENTIAL FOR SERIOUS INJURY FROM CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION. THIS IS DUE TO CHARGES RETAINED BY THE CAPACITORS. TO AVOID SERIOUS INJURY, ALWAYS DISCONNECT POWER, THEN DISCHARGE CAPACITORS BY USING AN APPROVED GROUNDING ROD PRIOR TO TOUCHING ANY PART.

<u>RESUSCITATION.</u> MAINTENANCE PERSONNEL SHOULD BE TRAINED IN CARDIOPULMONARY RESUSCITATION (CPR).

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This equipment contains static sensitive semiconductor devices and integrated circuits that may be damaged by Electro-Static Discharge (ESD). Take the necessary precautions before attempting service.

Any replacement circuit boards should be kept in metallized anti-static bags until immediately before installation. Ground yourself (touch the outside of a grounded metal enclosure) before removing circuit boards from their protective bags. Avoid touching components when handling the boards.

SECTION 2. GENERAL INFORMATION

2.1   Scope

This manual provides information about the installation, operation, and maintenance of the Programmable Logic Controller Health Monitoring and Reporting (PLCHMR) System manufactured by Honeywell.

2.2   General Description

The PLCHMR system is a retrofitable health monitoring and reporting system for Honeywell's high intensity flashing white obstruction lighting system. A majority of the system's functionality is contributed by the PLCHMR module. It is designed for use with the StrobeGuard®, Model SG-60E High Intensity Obstruction Lighting System. The system is designed and manufactured in compliance with Federal Aviation Administration Advisory Circular 150/5345-43E. The PLCHMR system will monitor and report on up to 24 flash-heads controlled by a single controller at distances up to 2500 feet.

The PLCHMR System module is shown in Figure 2.2-1. The major components of the retrofit kit consist of the following:

- PLCHMR System Module P/N 40002083-001
- Model SGC-60 Master Controller replacement Micro-Controller Unit (MCU P/N 40002085-001)
- Model SGF-60 Flash-head replacement micro-controller units (one for every flash head P/N 40002084-001)

2.2.1 PLCHMR System Module

The PLCHMR module (see Figure 2.2-1) is a configurable microprocessor-based system that monitors a StrobeGuard®, Model SG-60E High Intensity Obstruction Lighting system via the RS485 control and status network. The PLCHMR outputs alarm status via dry contact relays to a remote alarm monitoring system. The PLCHMR module is preassembled and consists of three circuit card assemblies affixed to mounting plate. The module provides 2 wiring harnesses that must be attached to two terminal connectors located on the Model SGC-60 Master Controller (See Figure 2.2-2).

2.2.2 Model SGC-60 Master Controller replacement Micro-Controller Unit

The Master Controller (see Figure 3.3-1) is a micro-controller based system that controls the flash interval and timing, flash intensity, and monitors the complete StrobeGuard® system via the StrobeGuard® RS485 control and status network (SCSN). The MCU must be replaced during the installation process in order for the PLCHMR to monitor the SCSN. Software in the new micro controller changes the baud rate of the SCSN from 300 to 9600 baud. A replacement MCU is provided as part of the upgrade kit (P/N 40002085-001 and replaces P/N40000328-001).

2.2.3 Model SGF-60-E Flash-head replacement Micro-Controller Unit

The SGF-60E Flash-head (see Figure 2.2-3) is a micro-controller based system that is designed to control a capacitor discharge xenon flash tube unit. The Flash-head receives its flash interval, timing, flash intensity commands from, and returns status to the Master Controller via the SCSM. Replacement MCUs are provided as part of the upgrade kit (P/N 40002084-001 and replaces old MCU P/N40000324-001).

Power On LED

PLCHMR
Configuration
Serial Port

Power Supply

Top view

Single Board
Computer

Side view

Mounting Plate

Relay Interface
Card

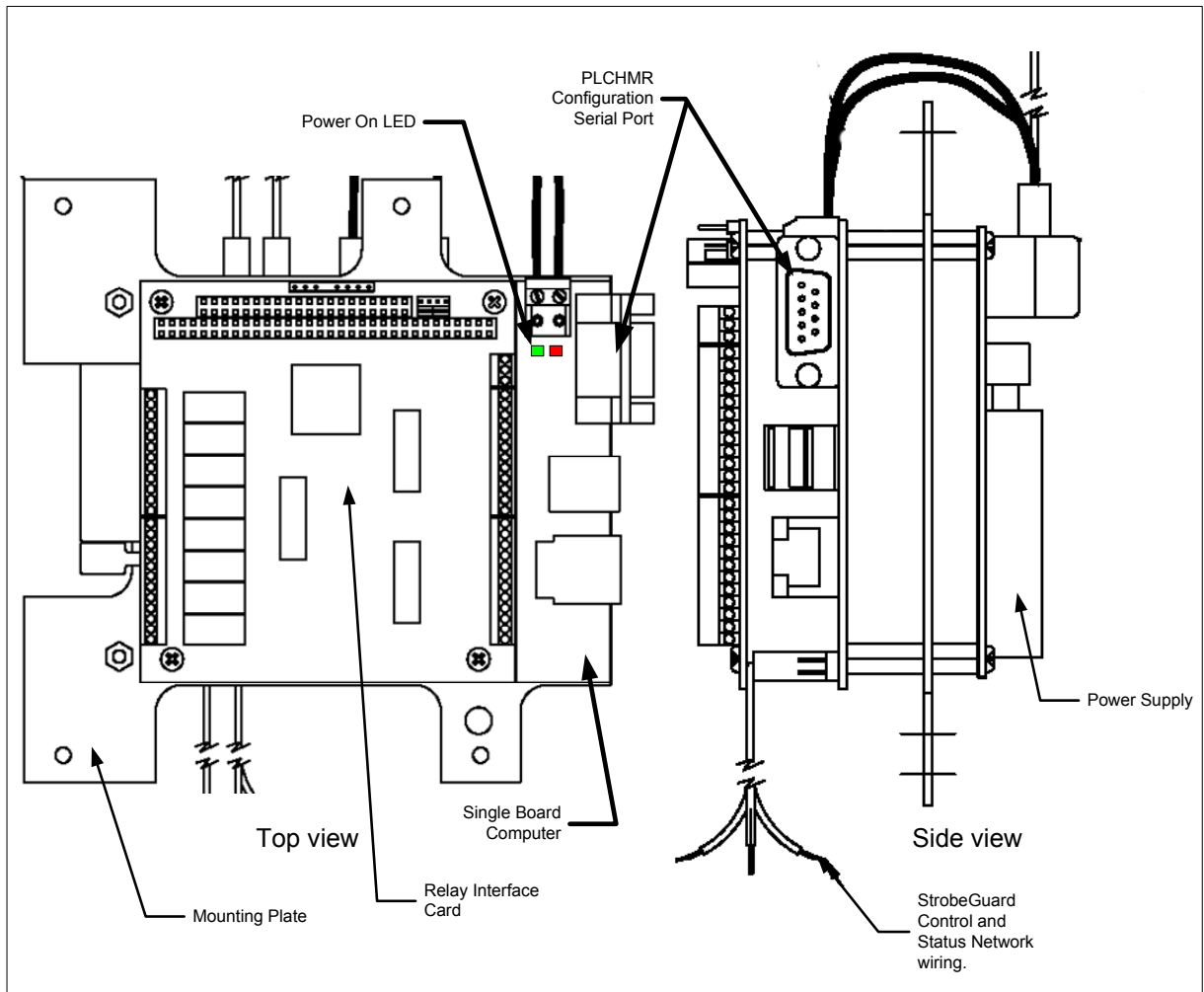StrobeGuard
Control and
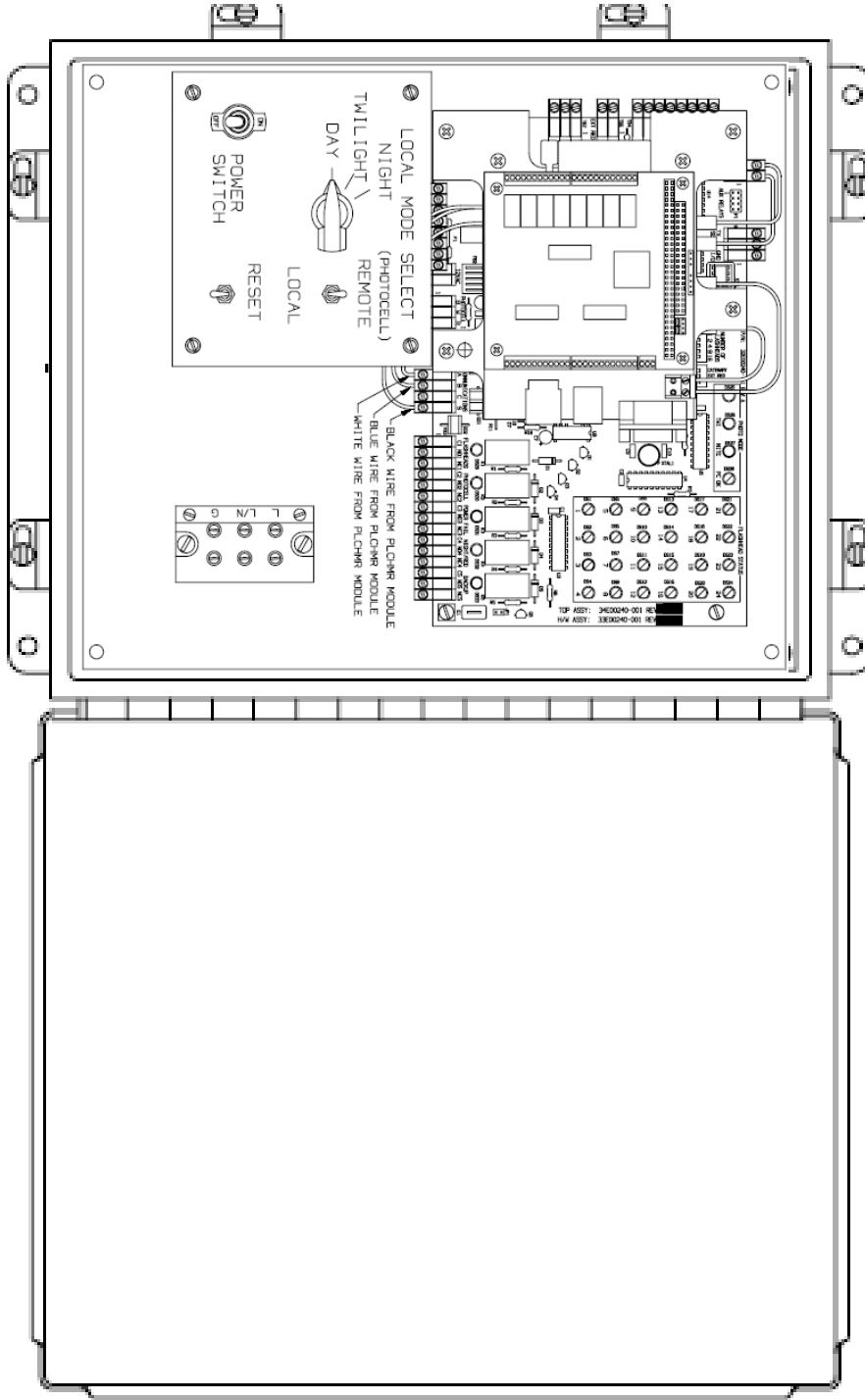Status Network
wiring.

Figure 2.2-1 PLCHMR Module

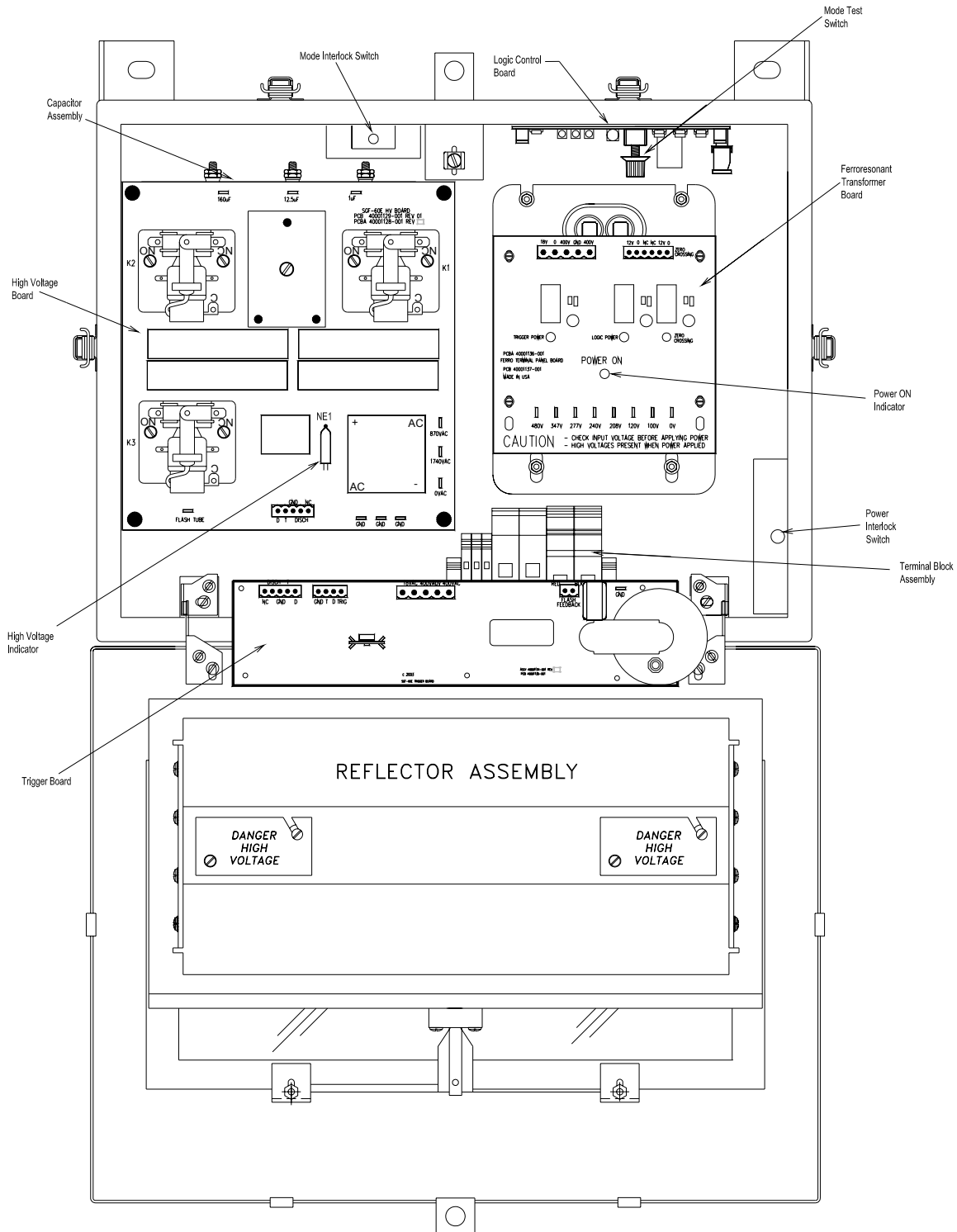**Figure 2.2-2 Master Controller with PLCHMR Module Installed**

Figure 2.2-3: Model SGF-60E Flash Head

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. Honeywell 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 fuse / Breakers 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 fuse holders must be avoided.

4. Electrical energy available at many points may result in personal injury or death 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, only a skilled person who is aware of the hazard involved shall carry out maintenance. 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.

6. Make sure the input voltage selection on the Ferroresonant transformer assembly matches the line voltage before applying power to the unit.

   Capacitors inside the equipment may still be charged after the equipment has been disconnected from its power source, even though the equipment was designed to drain charge from the capacitors when power is removed. Do not put hands or tools in the Flash-head if the High Voltage Indicator neon lamp NE1 is ON, which is located on the High Voltage Circuit Board. (Refer to Figure 2.2-3)

7. Do not confuse the High Voltage Indicator NE1, with the POWER ON Indicator located on the Ferro resonant Transformer Assembly. It is possible for the High Voltage Indicator NE1 to be ON After the main AC power to the unit is turned OFF (POWER ON Indicator is OFF). If this happens, the energy stored in the capacitor Assembly must be discharged before performing maintenance.

8. Capacitor Discharge Procedure. Attach one end of the capacitor discharge tool to chassis ground first, then the other end to any of the relay terminals. Hold for 3 seconds, or until the indicator turns off.

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This system uses lethal voltages in the Flash-head. Unless absolutely necessary, do not attempt to service or adjust the equipment with AC line power applied.

Safety interlock switches are provided in the Flash-head enclosure to interrupt main AC power to the power supply. These interlock switches are activated when the Flash-head door is opened in a conventional manner. No interlock is provided when other means of access are used. Do not tamper with the interlocks by opening or shorting the terminals.

The POWER ON Indicator is ON when the Ferroresonant Transformer is powered. If the POWER ON Indicator is OFF, Line input AC power may still be present in the system.

AC LINE VOLTAGE IS STILL PRESENT WHEN INTERLOCKS ARE ACTIVATED. DISCONNECT POWER AT THE MAIN AC CIRCUIT BREAKERS BEFORE INSPECTING OR SERVICING, UNLESS ABSOLUTELY NECESSARY TO PERFORM MAINTENANCE WITH POWER ON.

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Flash tubes in this lighting system produce brilliant flashes of light containing some ultraviolet radiation that can cause temporary or permanent eye damage.

DO NOT LOOK DIRECTLY AT THE FLASH-HEAD WHILE IT IS IN OPERATION.

2.3   Specifications

Electrical Input:
    PLCHMR Module .... 3 Watts. 5 VDC.

Mechanical Properties:
    PLCHMR Module
        Weight..2 pounds (4.4 kg)
        Dimensions ....5.6"w (142mm) x 5.7"h (145mm) x 2"d (51mm)

Operating Environment:
    Operating Temperature ....-55ºC to +55ºC
    Humidity..95% relative humidity

System Operating Status Indicators:
    PLCHMR, DC line power present .... Green LED POWER ON Indicator

SECTION 3. INSTALLATION & POWER UP

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Modifications to the Power Supply are required for certain applications. Remove input power at circuit breakers and discharge capacitors with an approved grounding rod before attempting any necessary modifications.

3.1   Unpacking

Carefully unpack each item and remove any internal packing material from the PLCHMR. Carefully check the supplied materials with the PLCHMR bill of materials. There are many small items that should be supplied inside clear plastic bags, verify each of these bags contain the proper amount of parts per the bill of materials. Report any shortages of materials immediately to the Honeywell Technical Support.

Examine each item for obvious physical damage. Report any claims to the carrier immediately.   Pertinent information such as installation drawings, schematics, interconnection drawings, and operation manuals are included in the carton.   The upgraded 8051 micro-controllers (MCU) replacements for the master control and each flash head are in a separate package(s) inside the carton. Do not remove 8051 MCUs from their respective packaging until you are ready to install them.

3.2   User Supplied Tools

      PC computer with RS232 serial port,
      Serial port parameters: 115200 baud, 8 data bits, no parity, 1 stop bit.
      Terminal Emulator – MS Windows Hyper Terminal, Tera Term
      Screwdriver ¼:" slot-type
      Screwdriver 1/16" slot-type
      Small Phillips screwdriver
      DB9 to DB9 Female/Female RS2232 Null Modem Serial Interface Cable (Radio Shack Model 03044 Catalog # 55010600 or equivalent)

3.2.1   Master Controls Switch Setting For Installation

Set Master Controller switches (Shown in Figure 2.2-2) as follows:

      POWER SWITCH --- OFF
      LOCAL / REMOTE Switch --- LOCAL
      MODE Switch --- DAY

The Master Controller has the following control switches (Figure 2.2-2):

- POWER SWITCH: Toggle switch that turns input AC line power on/off in the Master Controller. Does not affect AC power to the Flash-heads. Input voltage is present at terminal block PB1, even with the power switch turned off.

- RESET Switch: Momentary pushbutton that resets the Master Controller. Switch must be held for about one second to activate.

- REMOTE / LOCAL Mode Switch: Two-position toggle switch that permits manual (local) selection of the flash intensity level using the DAY / TWILIGHT / NIGHT rotary switch. In normal (remote) operation, permits automatic operation controlled by the Ambient Light Sensor photocell.

- DAY / TWILIGHT / NIGHT Switch: Three-position rotary switch that allows manual selection of three light intensities of the system (DAY = high, TWILIGHT = intermediate, and NIGHT = low). The REMOTE / LOCAL Mode Switch must be in the LOCAL position to use this switch.

3.2.2   Power Configuration

The PLCHMR input voltage selection is set at the factory prior to shipping.

3.3   Installation

3.3.1   Installation Overview

The installation has four major activities:

☐ First, replace the Master controller's MCU with the one MCU provided by the kit

☐ Second, mount and wire the PLCHMR module.

☐ Third, replace the MCU in each Flash-head's digital control board with the MCU provided by the kit.

☐ Fourth, the PLCHMR's site specific configuration table must be edited to match the configuration of the high intensity strobe system; this activity is described in Section 3.7.

The following sub-sections feature detailed instructions for completing the installation outlined above.

3.3.2   SGC-60 Master Controller MCU Upgrade

The installation kit provides one new MCU P/N 40002085-001 to replace the old MCU P/N 40000328-001. It is important to install the MCU with the proper orientation since, more often than not installing a MCU backwards will result in damage to the chip and/or surrounding circuitry. First note the location of pin 1. To find pin 1 look for a small rectangular notch on one of its short ends this denotes the top side of MCU; the first pin counter-clockwise from this notch is pin 1. The MCU is pressed into a socket. The

MCU's socket has a notch along the outside edge on one of the short sides this is the top side of the socket.

> ## CAUTION!

Do not use excessive force when you remove or install the chip from/into its socket. Excessive force can bend or damage the MCU Pins or the socket.

Step 1

Gently remove the old MCU using a small flat head screwdriver to pry it free of its socket. Set aside the old MCU.

Step 2

Carefully place the new MCU in the empty socket with top of the MCU and pin 1 in the same locations as noted earlier. Inspect all of MCU's pins checking that each pin is inserted into its respective contact and that none of the pins of have "roll under" or "bend out" of the socket.

Step 3

Carefully press the new MCU into the empty socket until it is firmly seated on the socket.

Step 4

Place the old MCU into the new MCUs empty shipping container.

A detailed drawing showing the location of the MCU in the Master Controller is shown in Figure 3.3-1.
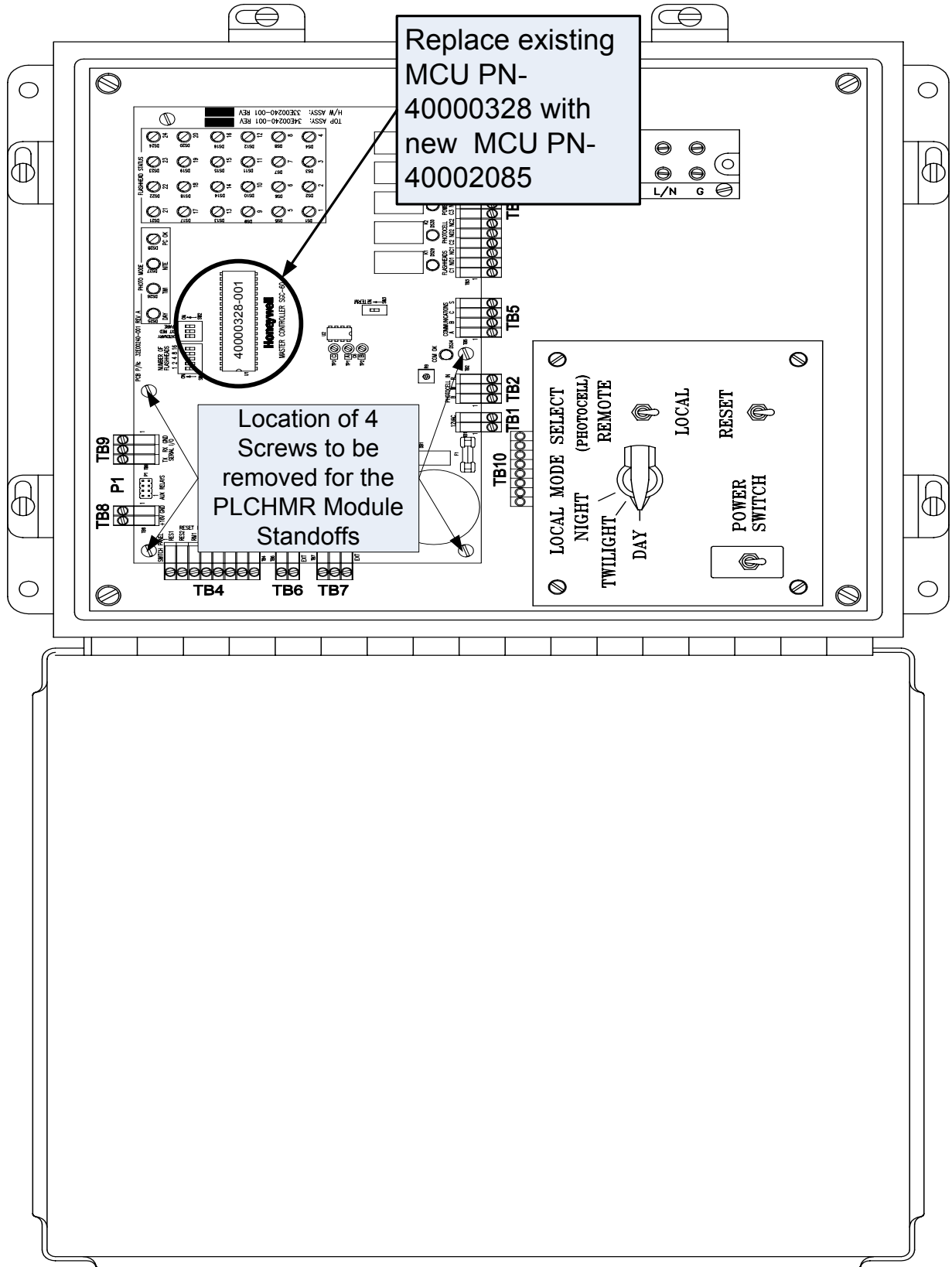
Replace existing MCU PN-40000328 with new MCU PN-40002085

Location of 4 Screws to be removed for the PLCHMR Module Standoffs

Figure 3.3-1 Model SGC-60 Master Controller with MCU High-lighted

3.3.3   PLCHMR Module Installation

The installation kit provides a PLCHMR module P/N 40002083 that is mounted inside the Master Controller Enclosure. This module is mounted to four 2.5" high standoffs and has five (5) wires to connect to the Master Controller board.

3.3.3.1   PLCHMR Module 2.5" Standoff Installation

Remove and save the four (4) 6-32 screws that secure the Master Controller to the enclosure's bottom panel (Refer to Figure 3.3-1 for exact screw locations). The four saved screws will be used in a later step to secure the PLCHMR module mounting plate to the standoffs.

3.3.3.2   PLCHMR Module Power Supply Connections

The PLCHMR module receives 16VDC power from Terminal Block-8 located on the top left hand corner of the Master Controller PCB as shown in Figure 3.3-2. Note the orientation and locations of the two positions on the plug-in terminal with respect to the +16 and GND Labels shown on the Master Controller PCB. Remove the two position plug-in terminal and loosen both of the plug-in terminal's screw sufficiently to install the PLCHMR module's red and black wires. The red wire should be inserted into the screw terminal position labeled #2 as shown Figure 3.3-3 which connects to the +16 contact on the Master Controller PCB. The black wire should be inserted into the screw terminal position labeled #1 as shown Figure 3.3-3 which connects to the GND contact on the Master Controller PCB.
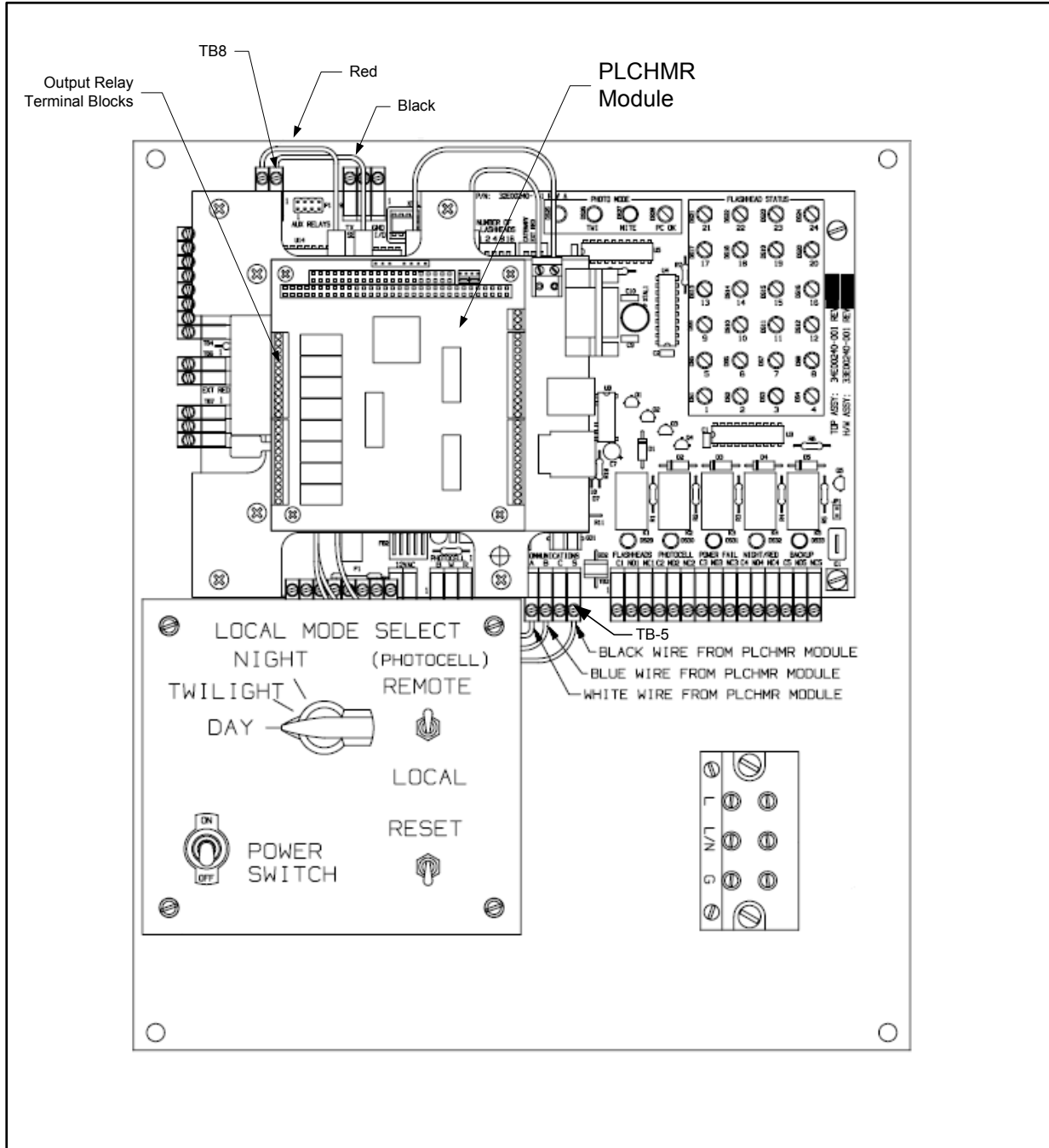
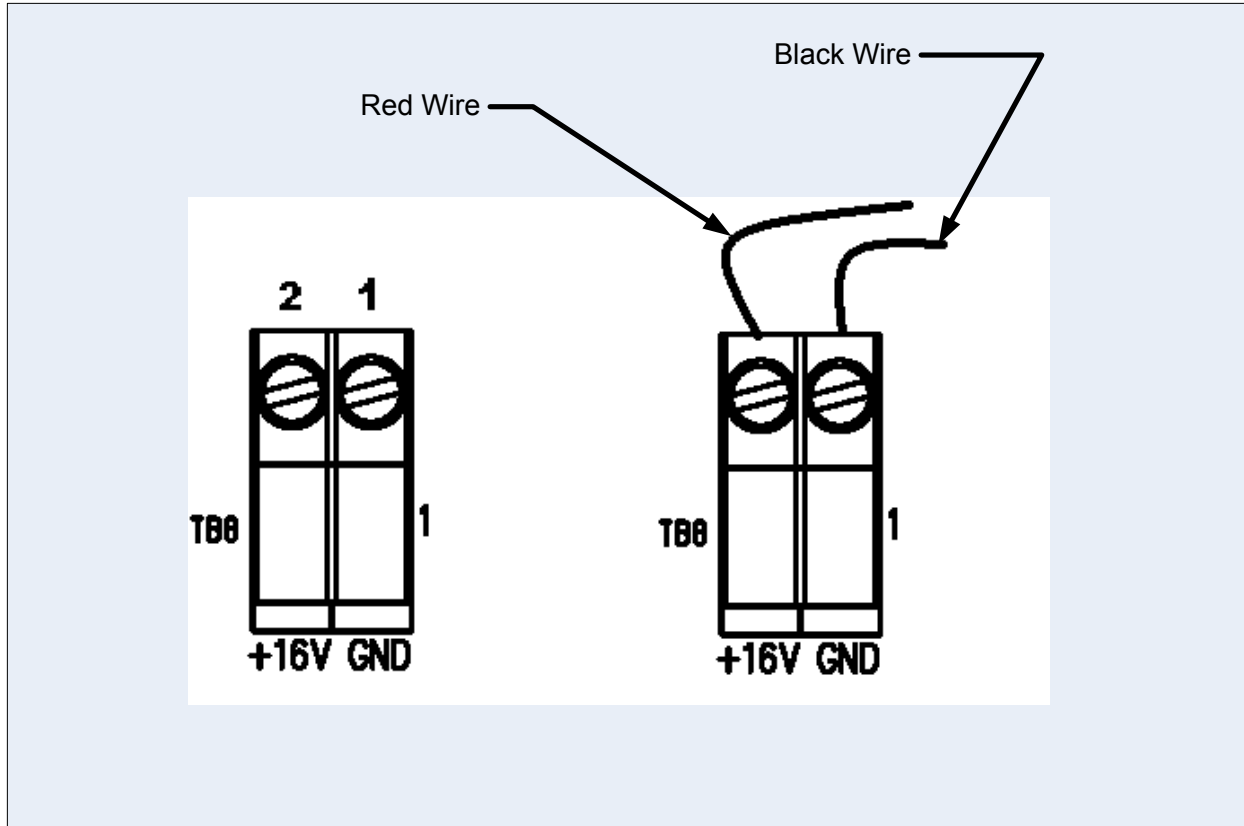**Figure 3.3-2 PLCHMR Module Mounted on and Wired to Master Controller**

Figure 3.3-3 Terminal Block- 8 +16V - Red and GND –Black Wire Connections

3.3.3.3   PLCHMR Module Mount

The PLCHMR module mounts to the four 2.5" high standoffs that were installed per directions in Section 3.3.3.1. Note the location and orientation of the PLCHMR module as shown in Figure 3.3-2 relative to the Master Controller.   Oriented the PLCHMR module and place it approximately as shown per Figure 3.3-2 on the 2.5" high standoffs. Then re-connect the two position PLCHMR power supply plug-in with its mating header block on the Master Controller. Carefully position the PLCHMR module so that the four (4) mounting plate holes line-up with four tapped bores in the 2.5" standoff.   Secure the mounting plate to the standoff by installing the four (4) 6-32 screws removed during the Section 3.3.3.1 activities.

3.3.3.4   PLCHMR Module StrobeGuard Control and Status Network Connections

The PLCHMR module connects to the StrobeGuard Control and Status Network via Terminal Block-5 which is located near the bottom center of the Master Controller PCB as shown in Figure 3.3-2. Before starting this task, note any existing wiring connections along with their orientation and locations relative to the four position plug-in terminal connected to the Master Controller. Remove the four position plug-in terminal. Install the White, Blue, and Black PLCHMR's network wires as directed:

a) Loosen the plug-in terminal's screw labeled #1 as shown in Figure 3.3-4 sufficiently to insert the PLCHMR module's **White** wire into terminal position along with maintaining any existing wiring connections.

b) Next, loosen the plug-in terminal's screw labeled #2 as shown in Figure 3.3-4 sufficiently to insert the PLCHMR module's **Blue** wire into this terminal position along with maintaining any existing wiring connections.

c) Finally, sufficiently loosen the plug-in terminal's screw labeled #4 as shown in Figure 3.3-4 and insert the PLCHMR module's Black wire into the terminal position while maintaining any existing wiring connections.

Reinstall the plug-in terminal onto its corresponding fixed mating header located on the Master Controller.
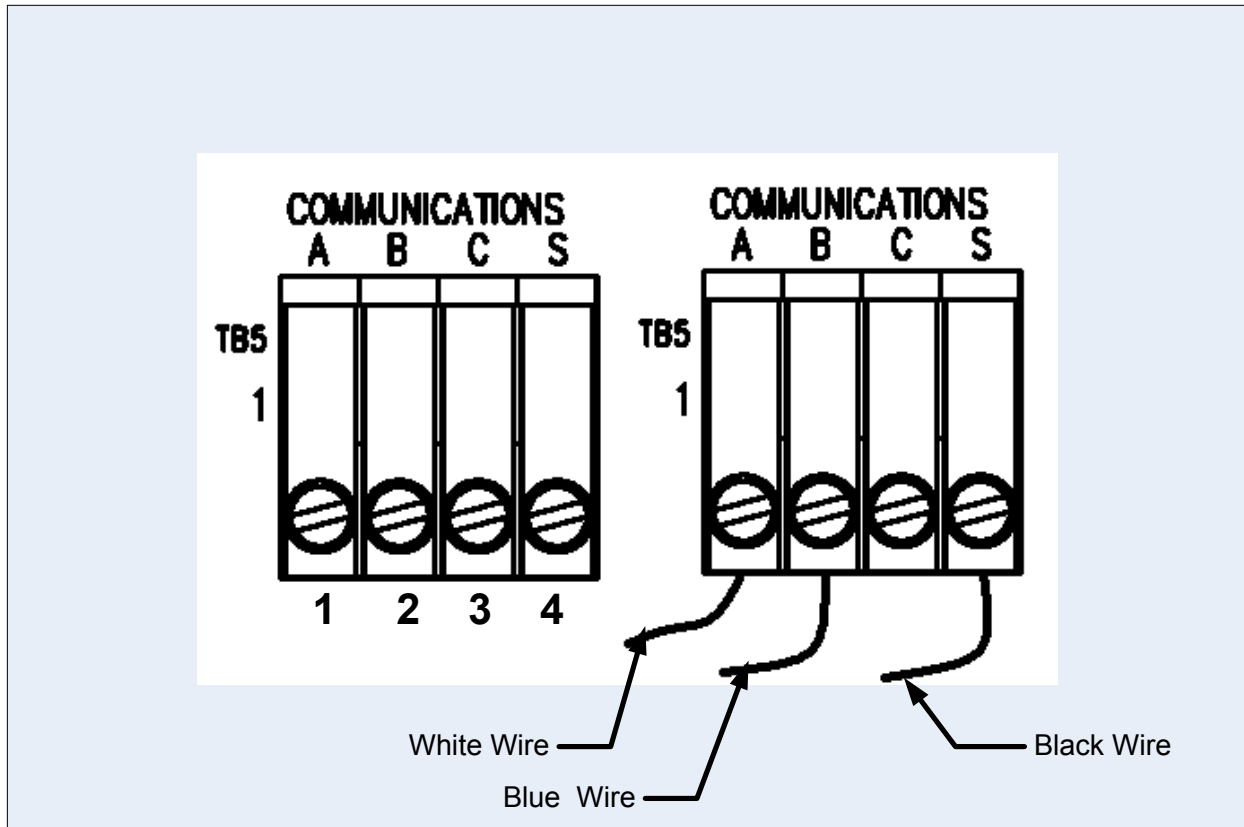
Figure 3.3-4 StrobeGuard Control & Status Network Wiring Connections

3.3.4   SGF-60-E Flash-head Digital Controller MCU Upgrade

The installation kit provides new MCUs P/N 40002084-001 to replace all existing old MCUs P/N 40000324-001 in Flash Head Logic Control Board. See Figure 2.2-3 for the location of Logic Control Board in the Flash Head Enclosure. It is important to install the MCU with the proper orientation since more often than not installing a MCU backwards will result in damage to the chip and/or surrounding circuitry. First note the location of pin 1. To find pin 1 look for a small rectangular notch on one of its short ends this denotes the top side of MCU; the first pin counter-clockwise from this notch is pin 1.

The MCU is pressed into a rectangular socket. This socket has a notch along the outside edge on one of the short sides this is the top side of the socket.

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│   **CAUTION!**   │
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Do not use excessive force when you remove or install the chip from/into its socket. Excessive force can bend or damage the MCU Pins or the socket.

Step 1

Gently remove the old MCU using a small flat head screwdriver to pry it free of its socket. Set aside the old MCU.

Step 2

Carefully place the new MCU in the empty socket with top of the MCU and pin 1 in the same locations as noted earlier. Inspect all of MCU's pins checking that each pin is inserted into its respective contact and that none of the pins of have been "rolled under" or "bent out" of the socket.

Step 3

Carefully press the new MCU into the empty socket until it is firmly seated on the socket.

Step 4

Place the old MCU into its replacement's empty shipping container.

A detailed drawing showing the location of the MCU in the Flash-Head's Digital Master Controller is shown in Figure 3.3-5.
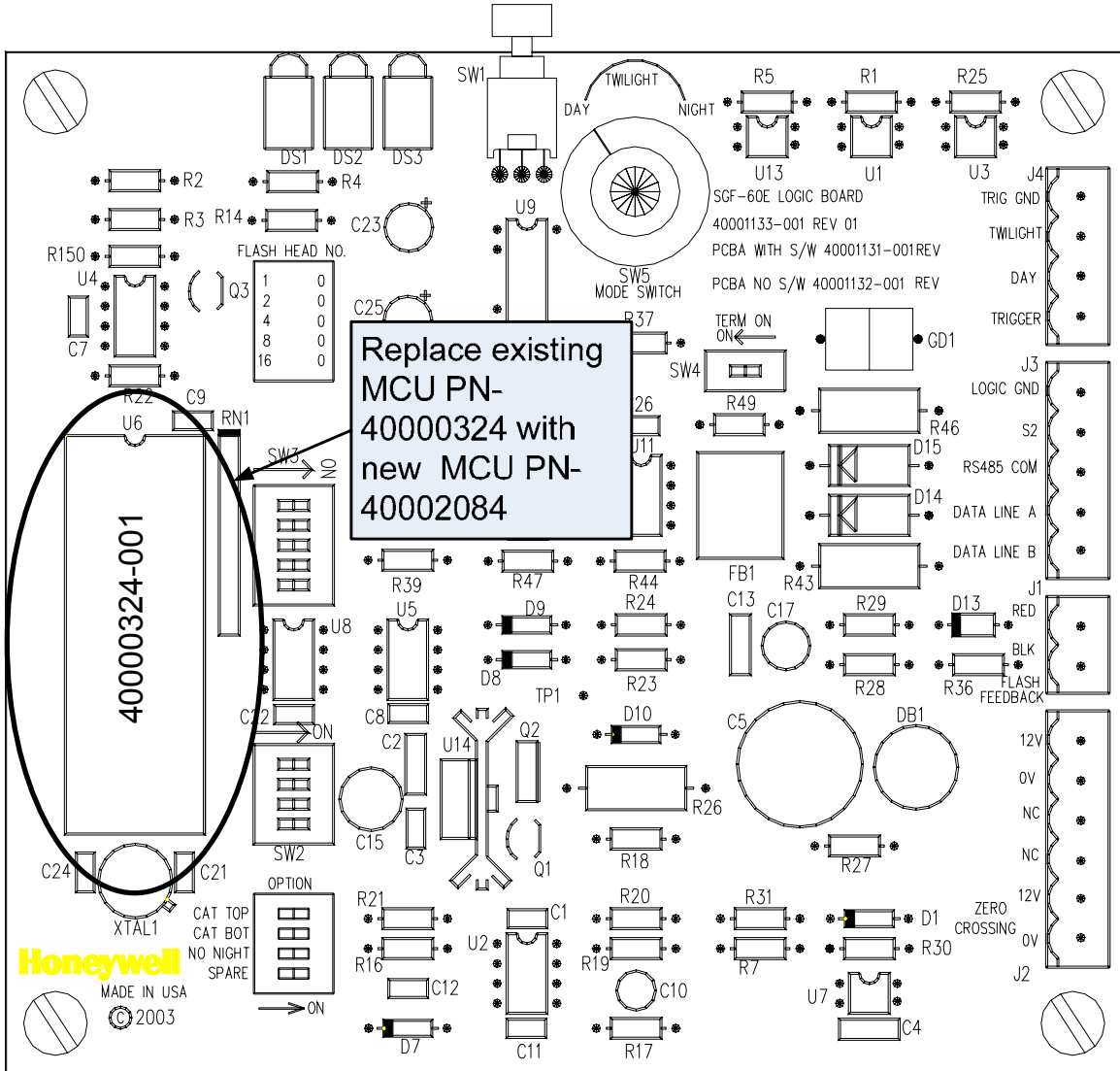
Figure 3.3-5 MCU Location on Flash Head Digital Logic Controler

3.4 Flash Head Status Reporting Relay Installation Wiring

The PLCHMR features eight (8) configurable status reporting outputs. Each output connects to a form-c relay via three screw terminal connections. Each screw terminal connection is uniquely tied to one of the relay's contacts. In accordance with Figure 3.4-1:

1) Terminal labeled #1 connects to the normally-open contact

2) Terminal labeled #2 connects to the common contact

3) Terminal labeled #3 connects to the normally-closed contact,

Typically each discrete alarm reporting connections is made to the site's alarm monitoring system uses terminals 1 & 2. Using the typical connection ensures that a fail/fault indication is reported in the event that power is interrupted to the SG-60 High Intensity Strobe Light System.

Each relay's state is controlled uniquely by its software Tier Reporting Mechanism (TRM). The TRM is software configurable and enables the operator via a menu to combine tier related flash-heads into a group that can be associated with a TRM. (See Section 3.7.3 for additional details on software configuration)

The two operating states (activated/deactivated) of each relay represent the state of its corresponding TRM. The TRM's two states are Flash/OK and Fail/Fault. The TRM state FLASH/OK represents a normal operation alarm level and is indicated by an activated relay. The TRM state Fail/Fault represents an abnormal operation alarm level and is indicated by a deactivated relay.

For example:

Assume that all the flash-heads on tier #1 are operating normally when some event causes a tier's flash-head to malfunction. While all of the flash-heads on tier 1 are ok, TRM #1 is set to FLASH/OK and relay #1 is activated. After the fault event occurs causing a flash-head on the tier to malfunction, then TRM #1 would automatically change to the Fail/Fault state which would de-activate relay #1.

An activated relay cause the normally-open contact to be closed allowing any signal applied to the common contact(#2) to appear on the normally-open contact (#1). For a deactivated relay the normally-close contact is closed allowing any signal applied to the common contact (#2) to appear normally-closed contact (#3).
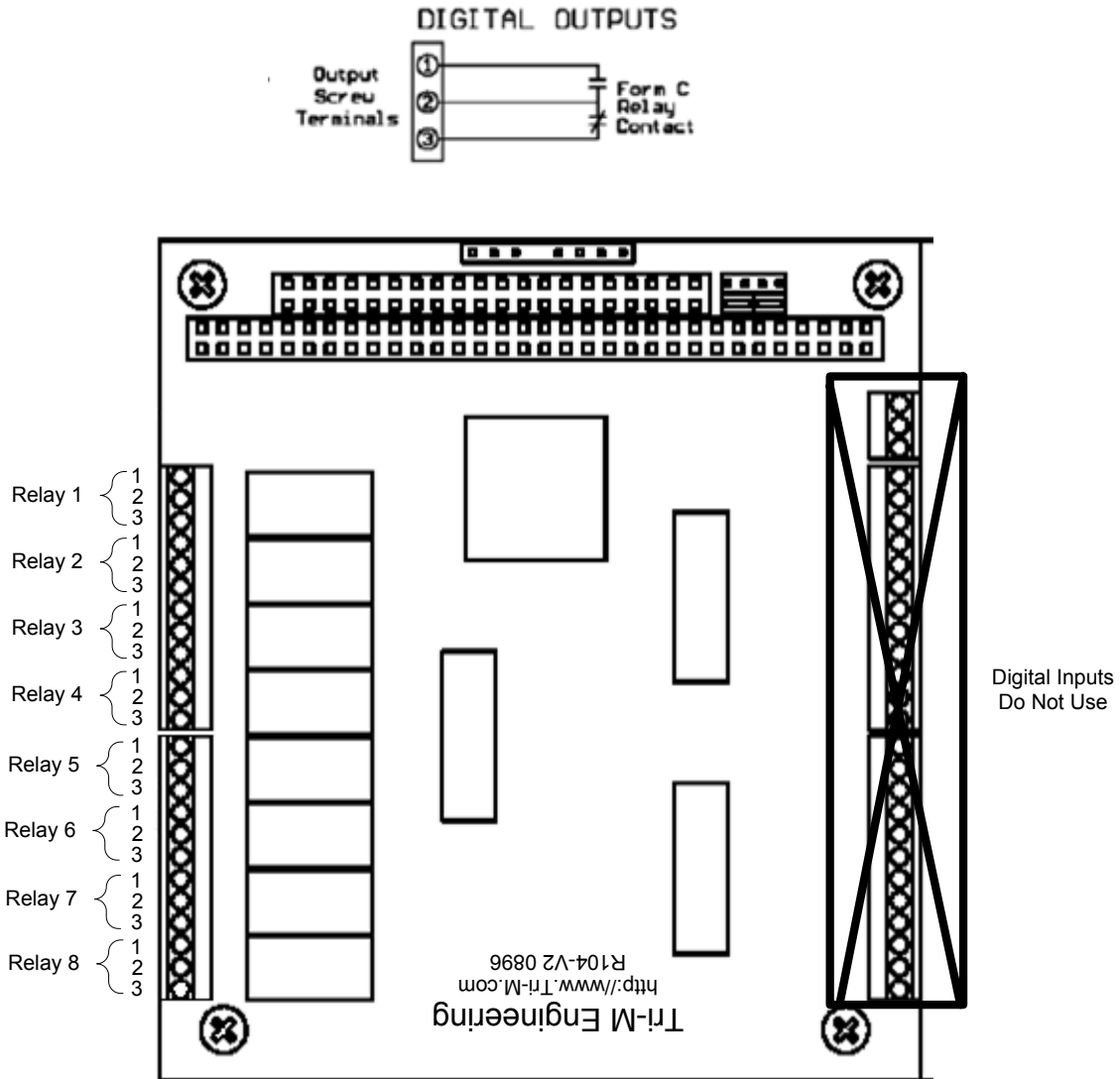
Figure 3.4-1 PLCHMR's Output Relay connection Diagram

-

3.5 Final Installation Check

Before applying power to the equipment, perform the procedures in the following sections. If any test does not pass, please consult Sections 3.3.3.2 and 3.3.3.4 in this manual or call Honeywell Technical Support at (805) 581-5591.

3.5.1 Preliminary

1. Verify that all AC input power circuit breakers are turned off.

2. Check that the MCU on the Master Controller's printed circuit boards is properly seated in its socket.

3. Check that any user-installed wiring does not interfere with relay operation when covers are closed.

4. Check that replacement MCUs have been installed in all Flash-heads. Check that all Flash-head covers are shut properly for a weather-tight seal with all latches closed.

5. Set Master Controller switches as follows:

   POWER SWITCH -- OFF
   LOCAL / REMOTE Switch -- LOCAL
   MODE Switch --- DAY

3.5.2 Verify Correct Wiring from the PLCHMR Module to Master Controller

Check that power supply and StrobeGuard Network connectors on the printed circuit boards are properly seated in their sockets (Re-Verify that Sections 3.3.3.2 and 3.3.3.4 were performed correctly).

3.6 Power Up and System Tests

During the power up of the system, there are two LED lights, which will be checked to verify correct operation and installation. The following is a description of all the indicators on PLCHMR.

3.6.1 PLCHMR Status Indicators

- Power Status Indicators (Figure 2.2-1)
  - Red LED after power-up indicates Single Board Computer Fault
  - Green LED indicates Power is OK

3.6.2 System Power Up

All switches and indicators listed in this section are in the Master Controller, except for the external system circuit breakers.

1.   Verify POWER SWITCH is turned OFF.

2.   Verify LOCAL / REMOTE switch is set to LOCAL.

3.   Verify MODE switch is set to DAY.

4.   Turn on circuit breaker to apply power to Master Controller.

5.   Turn on circuit breaker to apply power to Flash-heads.

6.   Turn POWER SWITCH to ON.

7.   Verify that the Master Controller LED test sequence has started (See EPM-00001152 - Installation and Operating Guide for High Intensity Obstruction lighting). The test sequence will exercise every LED and relay (e.g. it will quickly sweep through the Flash-head Status LEDs in red and green mode).
After the test sequence completes, the Flash-head status LEDs for the selected number of Flash-heads shall be lit red then change to green as the Flash-heads report (DS1 - DS24, Figure 3.6-1 Item 4).

8.   After 1 minute, verify the number of Flash-head status LEDs (DS1 - DS24, Figure 3.6-1 Item 4) that are lit green matches the total number of white Flash-head lights (including AOL) on the tower (if there are n Flash-heads on the tower, Flash-head status LEDs DS1 - DSn shall be lit green). Verify that the remaining unused Flash-head status LEDs (DS$n+1$ - DS24) are turned off.

9.   After all the flash-heads report good (green), check the Master Control board's relay monitoring LEDs which should display following:

     i.   DS29-DS32 GREEN,

    ii.   DS33 OFF (DS29 - DS33, Figure 3.6-1 Item 5.) Verify Photocell status LED DS28 (Figure 3.6-1, Item 3) is lit green.

   iii.   Verify Day Mode LED DS25 (Figure 3.6-1, Item 3) is lit red, and the Twilight and Night LEDs (DS26 and DS27 respectively Figure 3.6-1, Item 3) are not lit.

   iv.   Hold down the RESET switch for approximately 1 second and verify the LED test sequence has restarted.

Wait 1 minute and measure the voltage between TB1-1 and TB1-2 to verify the voltage is 12-18 VAC. Repeat steps 7 - 10 to assure proper recovery after reset.
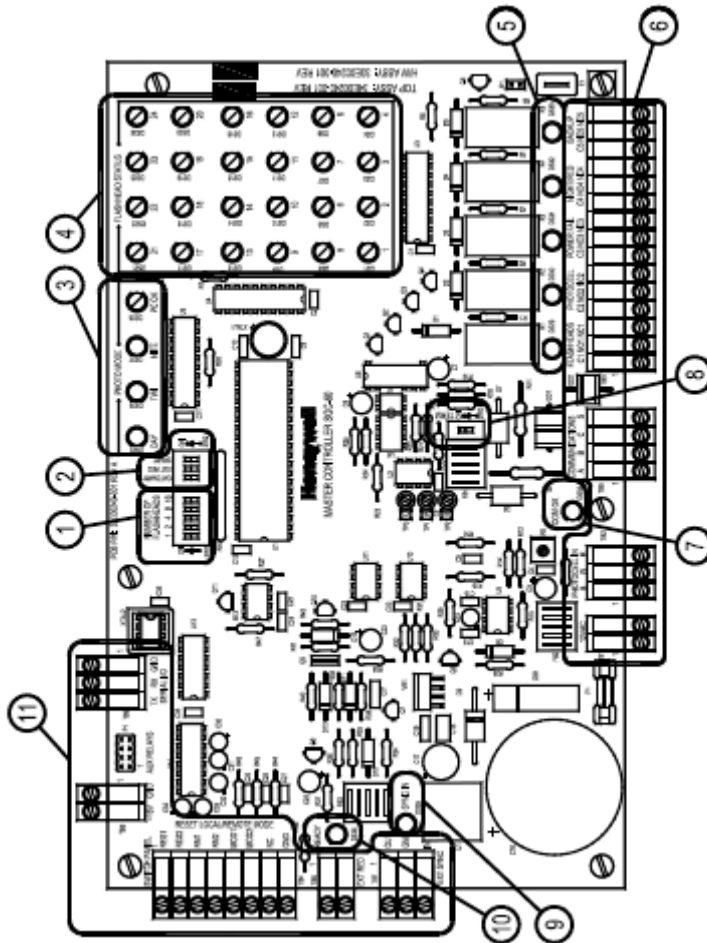

Figure 3.6-1 Master Controller Circuit Board

Note: Before performing any tests of the Flash Head Reporting Relay wiring the system must be configured using the PLCHMR System Maintenance and Configuration Menus.

3.7　PLCHMR System Maintenance and Configuration Menus

3.7.1　PLCHMR System Maintenance & Configuration Menus Overview

The PLCHMR system must be configured as part of the on-site installation. The PLCHMR's maintenance menus are used to view and modify the site specific configuration data. The maintenance menus use a text window interface along with a command entry prompt. The command entry prompt is posted at the bottom of terminal window and is marked with "**maint**>". Configuration data in the maintenance menus contains information about the site's lights, its reporting mechanism, and the facility information. The site's light configuration data contains information on how many lights, which tiers the lights are located, and height above ground level. The reporting configuration will specify if the reports are to be made via Ethernet or relays. The facility information will include: the owner, contact number, address, FCC number, Altitude, Longitude, and Latitude.

The maintenance menu system has a hierarchical structure which begins with the Health Monitoring System (HMS) home maintenance menu (see Figure 3.7-2). The home maintenance menu is the initial menu presented after the maintenance login is completed. The home maintenance menu can be recognized by the "HMS Maintenance Menu" title along with its four numbered menu items (See Figure 3.7-3).

Figure 3.7-1 PC to PLCHMR RS-232 Serial Port Interface Cable Connections
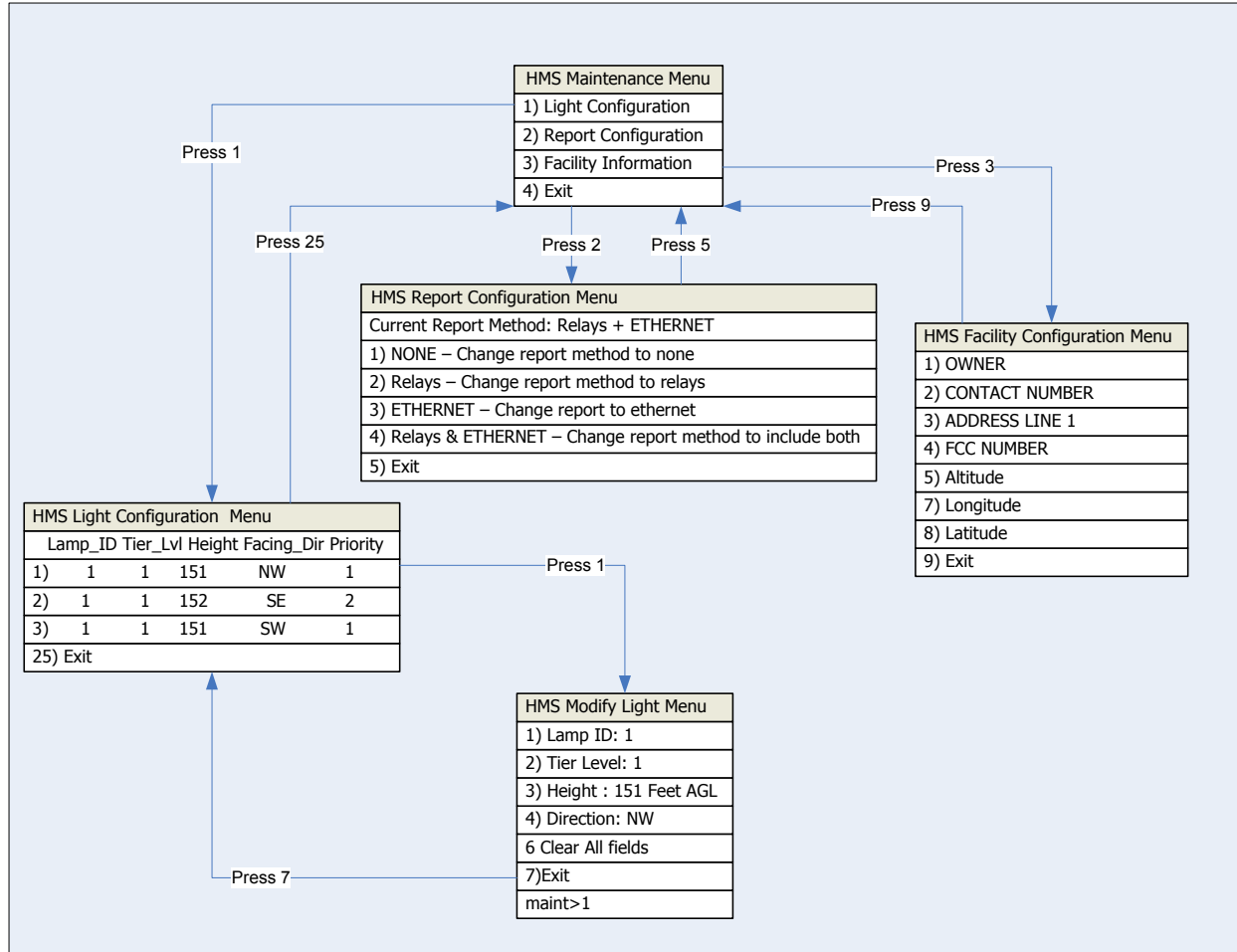
Figure 3.7-2 HMS Maintenance Menu Hierarchy

The following is a detailed set of instructions for navigating and utilizing PLCHMR's maintenance menu system.

3.7.2   HMS Maintenance Menu Login

Access to the Maintenance Mode menus is restricted. A login id and password are used to control access to the Maintenance Mode Menus. To gain access to the maintenance mode menu use the following steps:

a)   Connect one of the PC/Laptop's serial ports to the PLCHMR's serial port using a female/female null modem serial interface cable as shown in Figure 3.7-1 (Radio Shack Model 03044 Catalog # 55010600 or equivalent). The PLCHMR's serial port connection requires a DB-9 female connector.

b)   On the PC/Laptop start a terminal emulator. Either HyperTerminal or Tera Term is a suitable terminal emulator.

c)   Configure the PC/Laptop's terminal emulator's serial port parameters to:
   i)   115200 baud,
   ii) 8 data bits,

iii) no parity,
iv) 1 stop bit.
d) Apply power and wait for login prompt. If power is already applied and a login prompt is not shown press the enter key.
e) After the login prompt "***login >***" is displayed then type "maint" and wait for the password prompt.
f) At the password prompt "***password>***" type "grimes" and wait for Home Maintenance Window to be displayed (See Figure 3.7-3).
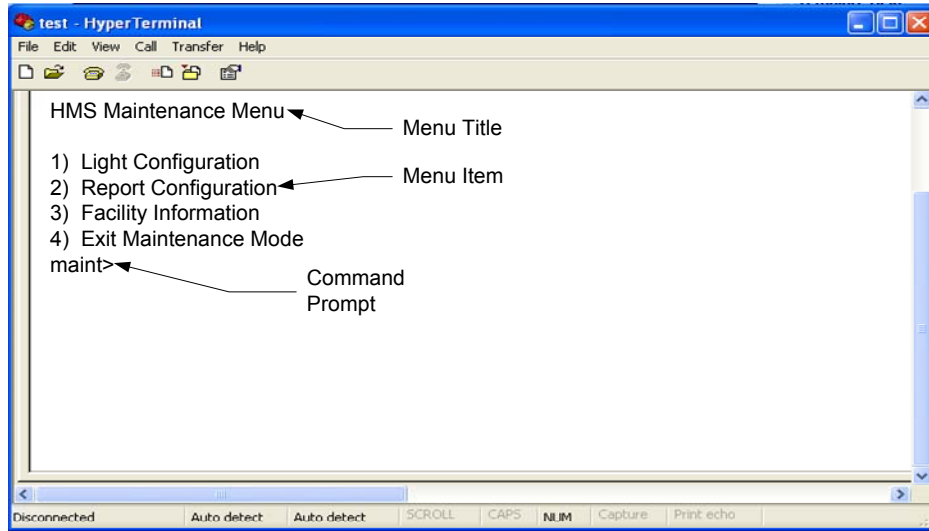

Figure 3.7-3 HMS Maintenance Menu

3.7.3   HMS Light Configuration Menu

The Light Configuration menu displays the current light configuration and allows the user to modify the configuration lines by selecting a line number at the User Prompt (See Figure 3.7-4). The Light Configuration menu can be recognized by the "HMS Light Configuration Menu" title along with its 24 numbered rows of light data.   The light configuration menu is a table with six columns and 25 rows. The first column contains the row number the remaining five columns have a unique heading.   Each row represents the location, orientation and priority data for a particular Flash head as identified by the number in the Lamp Id column its row.
The column heading definitions are:

i.   Lamp_ID – The unique address or ID# as set on Flash Head's digital logic board SW3. The maximum value for this entry is 24.

ii.   Tier_Lvl – The tier or level number for the Flash Head defined s. Typically the top tier of flash heads is numbered 1. The maximum value for this entry is 8. Each Tier_Lvl is associated with a Tier Report Mechanism (TRM) which controls the state of its reporting relay. The status of Tier_Lvl #1 is reported via relay #1. Up to 24 flash heads could be assigned to one tier. Typically 3-

4 flash heads are assigned to a tier as this would represent the physical installation of the flash heads on one tier of a tower.

   iii.   Height – The height as measured from ground level of the obstruction/tower.

   iv.   Facing_Dir – Nearest facing cardinal compass direction of the Flash Head. System defines eight (8) valid cardinal directions and they are:

       i.   N
       ii.   NW
       iii.   E
       iv.   SE
       v.   S
       vi.   S
       vii.   SW
       viii.   W
       ix.   NW

   v.   Priority – Maintenance Priority associated with Flash Head. The range of valid values is 0-25. Typically a value of 1 is used to represent the highest priority maintenance issue.
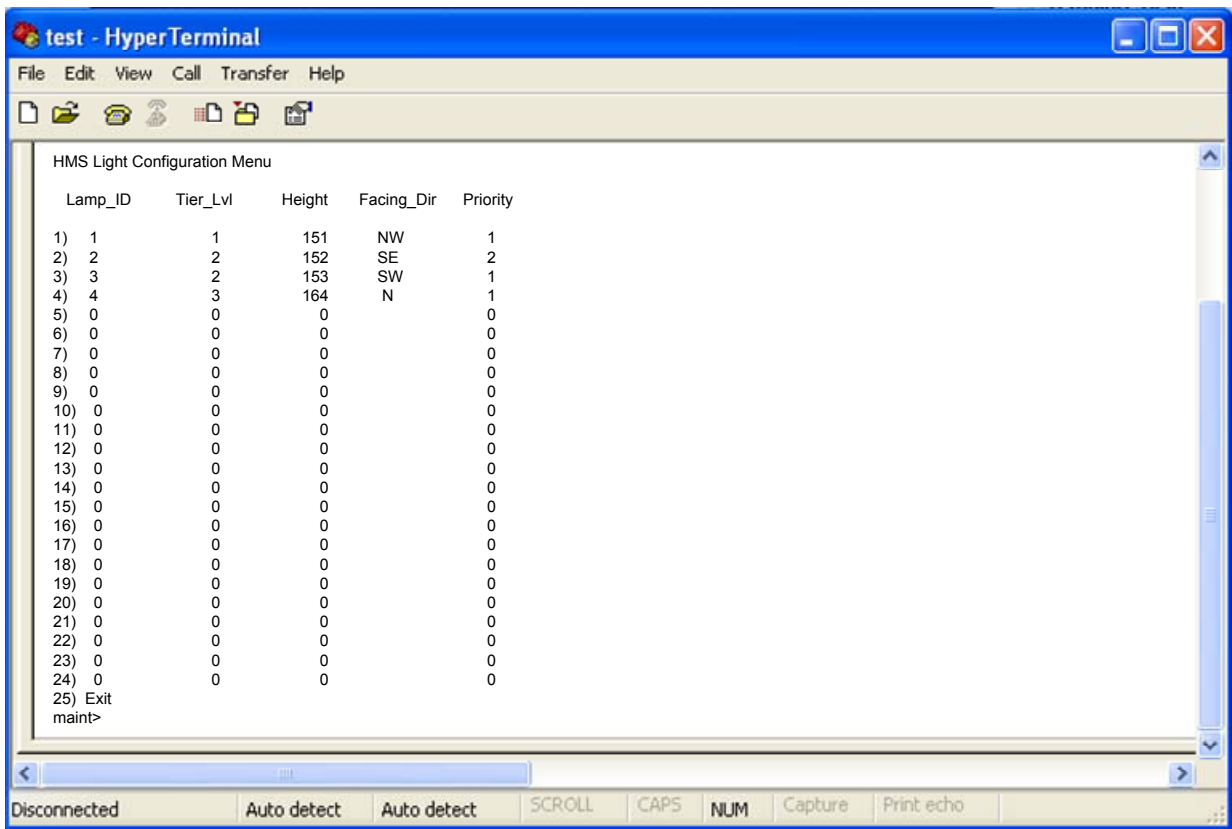
Figure 3.7-4 HMS Light Configuration Menu

To edit the contents of a specific row in the HMS Light Configuration Menu, enter the row number and press the enter key. This action will bring up the HMS Modify Light

Menu (see Figure 3.7-5. Once in the Modify Light Menus select the menu item to edit by entering the row number of the menu item and pressing enter.

To erase all configuration data for a specific light listed in the HMS Light Configuration Menu enter the row number of the light. This action brings up the HMS Modify Light Menu. Next input the number 6 followed by the "Enter" key. After clearing all data values input the number 7 along with an "Enter" key to exit to the HMS Light Configuration Menu. Selecting the "Exit" menu option commits any changes made in that menu to memory.
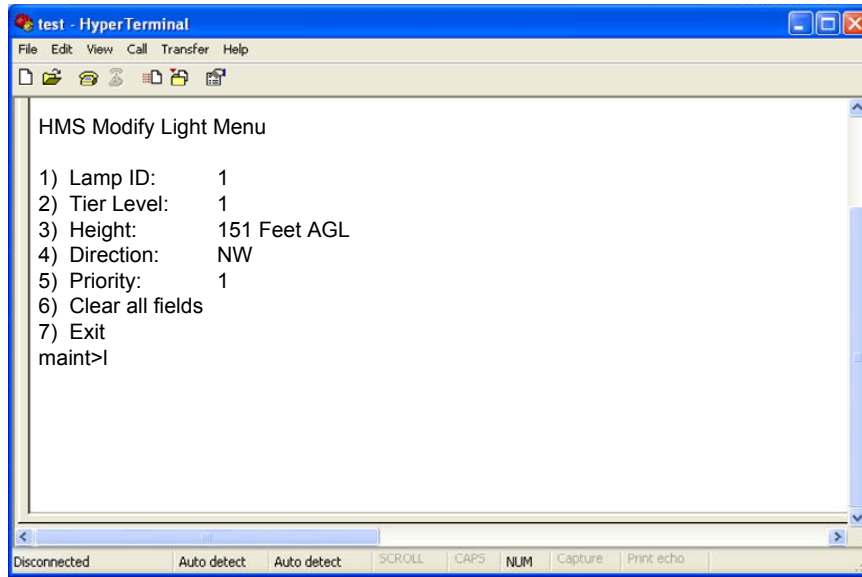
Figure 3.7-5 HMS Modify Light Menu

3.7.4 PLCHMR Report Configuration Menu

The Report Configuration Menu displays the current reporting configuration and allows the user to select one of four reporting methods (See Figure 3.7-6). Do not change this setting.
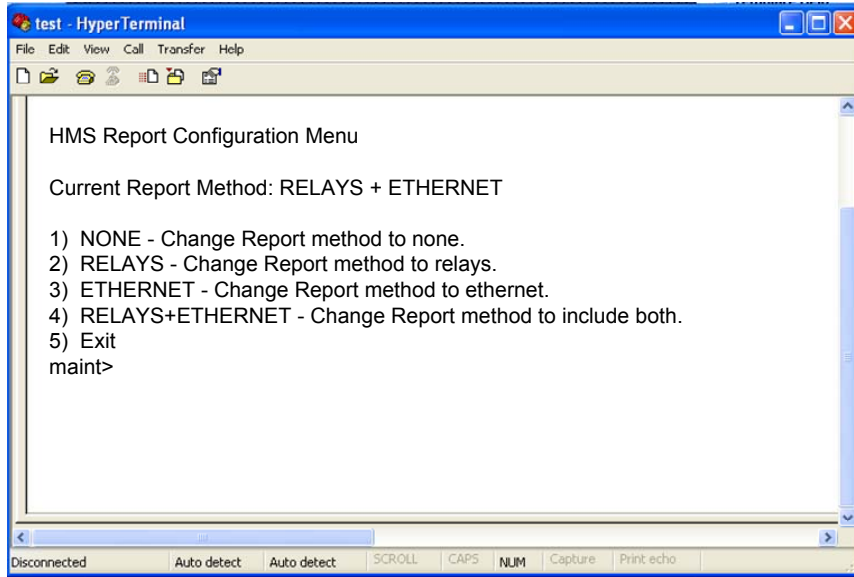
Figure 3.7-6 HMS Report Confguration Menu

3.7.5   PLCHMR Facility Configuration Menu

The Facility Configuration menu displays data about the facility's operator and its location. With this menu the user may edit any data line by selecting its line number at the User Prompt and pressing the enter key (See Figure 3.7-7).   The Facility Configuration menu can be recognized by the "HMS Facility Configuration Menu" title along with its 9 numbered rows of facility data.

Figure 3.7-7 HMS Facility Conguration Menu

3.7.6   Verify Local Mode Operation

All switches and indicators listed in this section are in the Master Controller.

   3.7.6.1   *Day Mode:*

   1.   Verify MODE Switch is set to DAY.

   2.   Verify Day mode LED DS25 (Figure 3.6-1, Item 3) is lit red.

   3.   After about 6 seconds, verify all Flash-heads are flashing in sync and in Day mode (maximum brightness).

   4.   Verify that the Flash-head Status LED for each Flash-head on the tower is lit green (including any AOL). Unused Flash-head status LEDs shall be off. (DS1 - DS24: Figure 3.6-1, Item 4)

   5.   Verify relay status LEDs DS29-DS32 are lit green, and DS33 is OFF. (Figure 3.6-1, Item 5)

   6.   If you have a Dual (Red/White) System, the Red Lights should be OFF.

   3.7.6.2   *Twilight Mode:*

   1.   Set MODE Switch to TWILIGHT.

   2.   Verify Day and Night mode LEDs (DS25 and DS27 respectively Figure 3.6-1, Item 3) are unlit and the Twilight mode LED DS26 is lit red.

   3.   After 6 seconds, Verify all Flash-heads are flashing in sync and in Twilight mode (medium brightness).

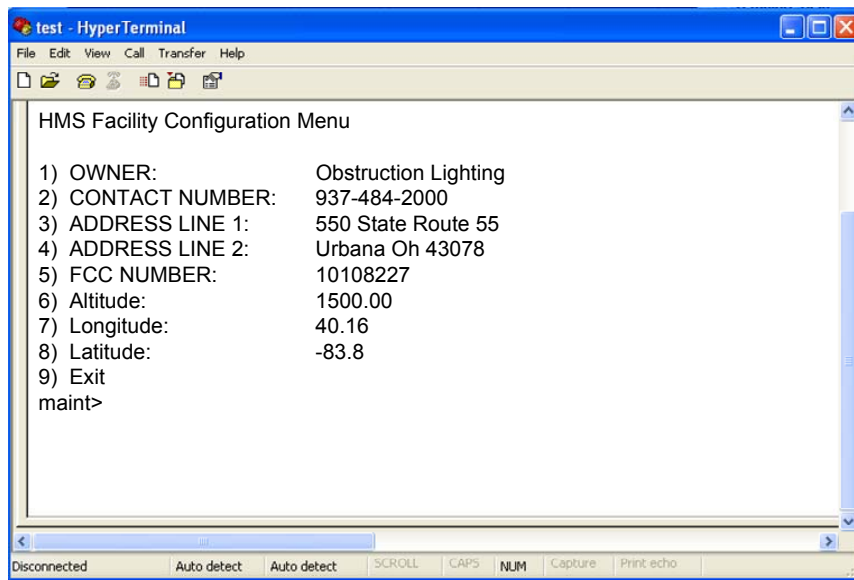   4.   Verify that the Flash-head Status LED for each Flash-head on the tower is lit green (including any AOL). Unused Flash-head status LEDs shall be off. (DS1 - DS24: Figure 3.6-1, Item 4)

   5.   Verify relay status LEDs DS29 - DS32 are lit green, and DS33 is off. (Figure 3.6-1, Item 5)

   6.   If you have a Dual (Red/White) System, the Red Lights should be OFF.

   3.7.6.3   Night Mode

   1.   Set MODE Switch to NIGHT.

   2.

   3.   Verify Day and Twilight mode LEDs (DS25 and DS26 respectively (Figure 3.6-1, Item 3) are unlit and Night mode LED DS27 is lit red.

   4.   Verify that the Flash-head Status LED for each Flash-head on the tower is lit green (including any AOL). Unused Flash-head status LEDs shall be off. (DS1 - DS24: Figure 3.6-1, Item 4)

5. Verify relay status LEDs DS29-DS31 are lit green, and DS32 and DS33 are off. (DS29 - DS33: Figure 3.6-1, Item, 5,)

6. <u>If you have a White-Only System</u>: After 6 seconds, Verify all Flash-heads are flashing in sync and in Night mode (lowest brightness, ~1/8 second duration bursts at 40 bursts per minute).

7. <u>If you have a Dual (Red/White) System:</u> Verify normal red night mode operation.

    (a)   Verify that all Flash-heads are OFF

    (b)   Verify that all Red Lights are ON and flashing properly, and the Red Light Controller does not indicate any alarms in the top-most Red Beacons.

    (c)   Verify that LED DS36 (EXT RED READY) is lit green (See Item 10, Figure 3.6-1).

8. <u>If you have a Dual (Red/White) System:</u> Perform the following steps to check white night backup operation.

    (a)   Simulate a Top Red Beacon failure.

        On a Honeywell 9LCA Series Control, this may be done with the B1 circuit breaker in the Control. Turn the B1 breaker off to activate the 9LCA Beacon Failure Alarm, or toggle the breaker momentarily to activate the 9LCA Flasher Bypass Alarm.

        Other Redlight systems have different controls, and may require removing Red Beacon power at the input power circuit breakers.

    (b)   Verify that the DS36 (External Red Ready) LED is OFF.

    (c)   Verify that the DS32 (Night/Red) LED is ON

    (d)   Verify that the DS33 (Backup) LED is ON

    (e)   Verify that all the Red Lights are OFF

    (f)   Verify that all Flash-heads are flashing in sync and in Night mode (lowest brightness, ~1/8 second duration bursts at 40 bursts per minute).

    (g)   Repair the simulated Red Beacon failure.

    (h)   Verify that DS36 (External Red Ready) LED is ON.

    (i)   Verify that the lighting system is still operating white strobes, and not red-lights.

    (j)   Set the MODE switch to DAY. Wait for the Flash-heads to switch to DAY mode (about 6 seconds). Set the MODE switch back to NIGHT. Wait for the Flash-heads to switch to OFF mode (about 6 seconds).

    (k)   Verify normal red night mode operation per Step 6 above.

(l)   If you have more than one Red Beacon at the top level, repeat the simulated failure test for each Red Beacon.

SECTION 4. PRINCIPLES OF OPERATION

4.1 Overall Description

The PLCHMR is a product that consists of hardware and software to provide health monitoring and remote reporting services. PLCHMR is integrated into the StrobeGuard® System. The PLCHMR uses a single board computer; manufactured by a respected industrial supplier of single board computers (SBC). The SBC provides sufficient processor bandwidth and memory support the intended health monitoring and reporting tasks. The SBC has an industry standard PC/104 bus to provide a common interface bus for a variety of off-the-shelf daughter boards. Industry standard daughter boards have been selected to provide the required input/output interfaces consistent with the demand of customer provided monitoring systems. In addition the SBC provides a 10/100 Ethernet interface and an RS-485 serial port interface. The PLCHMR will use its RS-485 serial network connection to receive and process health status data from the SGC-60. The RS-485 serial network bus will be referred to as the StrobeGuard Control and Status Network (SCSN). SCSN will be used to send commands and collect status data from each SGF-60 Flash Head connected to the RS-485 network. The PLCHMR is collocated within the SGC-60 Master Controller enclosure.

The PLCHMR reports each flash heads' health status via discrete outputs. Each flash heads' discretely reported status data will be a Flash/Fail report. PLCHMR System uses a uniquely configured relay output daughter board. This daughter board drives logic inputs provide by the customer at the remote facility. The relay output daughter board will provides 8 Form C relays to report the system's status. Screw terminals on the relay output board will enable setting the relay's output voltage. The normally closed relay contact will be used to report the fail condition.

The PLCHMR provides an interactive character based menu -oriented Maintenance Mode Service (MMS). The MMS is accessed via the SBC's Serial RS232 interface. The MMS is an interactive character-oriented communications session. A PC based client terminal service initiates a MMS session by logging onto the system as the "maint" user. The MMS validates the "maint" user via a password; it proceeds to establish a session with the client terminal service by initially presenting the Maintenance Mode menu.

4.1.1.1 Power Supply

The PLCHMR receive 16VDC power from the Master Controllers TB8 terminal connector. The 16VDC power is fed to a single output DC/DC Converter which produces 5VDC for the SBC.

4.1.1.2 Communications

The PLCHMR monitors commands from the Master Controller and Flash Head status reports via the RS485 serial link.

SECTION 5. MAINTENANCE

5.1   PLCHMR Module

The PLCHMR module requires no periodic maintenance.

SECTION 6. REPLACEMENT PARTS

<u>**Description**</u>   <u>**Part Number**</u>

SGC-60 Master Controller

     Master Controller Replacement MCU-------------------- 40002085-001

SGF-60-E Flash-head

     Digital Controller, Replacement MCU-------------------- 40002084-001

PLCHMR Module

     Module, Assembly -- 40002083-001

SECTION 7. APPENDIX A – EXAMPLES

7.1   Light Configuration Examples

The HMS Light Configuration Menu provides the flexibility and configurability to address most field installations. This section provides specific examples that demonstrate some possible configuration values that are the results of choices made in the Light Configuration Menu.   The PLCHMR system has eight (8) relays that can report the status of up to 24 Flash Heads. The Light Configuration menu enables the user to map the status reporting from any combination of Flash Heads to any one or all 8 of the relays. In section 3.4 it was declared that the relay's state is controlled by the software configured Tier Reporting Mechanism (TRM). Section 3.4 also indicated the TRM has two states FLASH/OK and FAIL/FAULT.   Software configuration of the TRM is performed through the HMS Light Configuration Menu. Each TRM can be assigned from zero to 24 Flash Heads. A Flash Head is assigned to a specific TRM via a numeric entry in its corresponding Tier_Lvl column in the Light Configuration Menu. For a TRM to activate its relay the status reported of all Flash Heads assigned to that tier must be FLASH/OK.   The TRM will deactivate its relay if any Flash Head assigned to it reports a FAIL/FAULT status.

For instance consider the following example on how a system with 24 Flash Heads could be configured:

In the following example consider a system with nine Flash Heads arrange on 3 physical tiers as shown in Figure 7.1-1.

A typical configuration could use seven Tier Reporting Mechanisms TRMs. Each of the top six Flash Heads could be assigned to its own individual TRM. The three lowest Flash Heads would be assigned to one of the remaining TRMs. The Flash/Fail status for the top six Flash Head would be collected by their assigned TRM and then reported by a relay whose number identifies the tier or (TRM) number. This would result in the top six Flash Heads having individualized status reports and the bottom three flash Heads having a collective status report. The Light Configuration Menu setting would appear as shown in Figure 7.1-2. An alternative view is presented in Figure 7.1-3 which shows the individual groups Flash Head groups reporting status to their assigned TRM which is connected to the reporting relay.

Tier 1

3 2 1

Tier 2

6 5 4

Tier 3

9 8 7

Flash Head Installation
with 9 Flash Heads, installed on
three tiers (levels). Each tier has
three Flash Heads. Flash Heads
numbers correspond to the unique
ID or address set on the Flash
Head's digital logic board switch
#3.
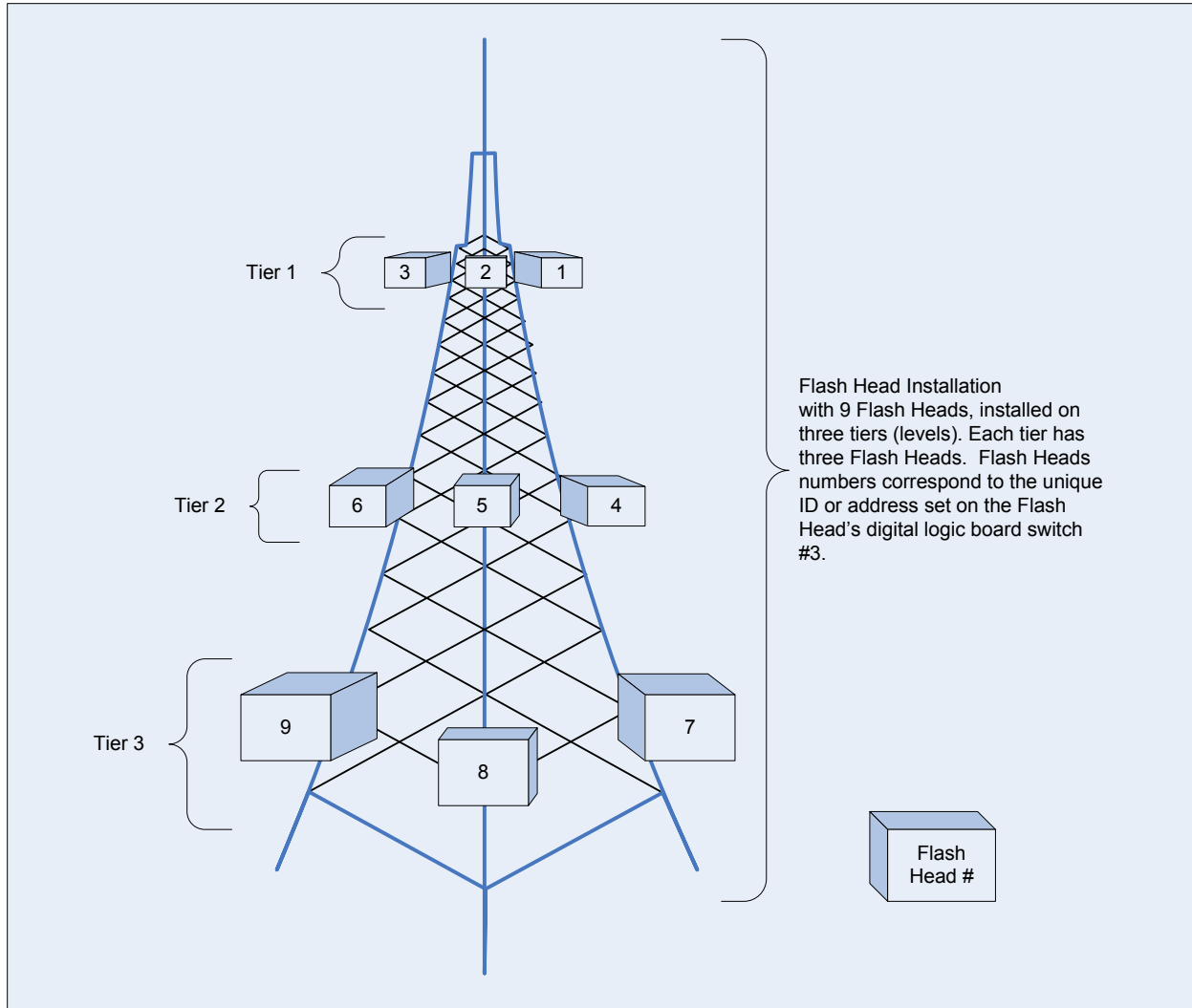
Flash
Head #

Figure 7.1-1 Tower Example with 9 Flash Heads on Three Physical Tiers

```
test - HyperTerminal
File  Edit  View  Call  Transfer  Help

HMS Light Configuration Menu

   Lamp_ID   Tier_Lvl   Height   Facing_Dir   Priority

1)    1         1        151       NW          1
2)    2         2        152       SE          1
3)    3         3        153       SW          1
4)    4         4        133       NW          2
5)    5         5        133       SE          2
6)    6         6        133       SW          2
7)    7         7        113       NW          5
8)    8         7        113       SE          5
9)    9         7        113       SW          5
10)
11)
12)
13)
14)
15)
16)
17)
18)
19)
20)
21)
22)
23)
24)
25) Exit
maint>

Disconnected        Auto detect    Auto detect    SCROLL   CAPS   NUM   Capture   Print echo
```
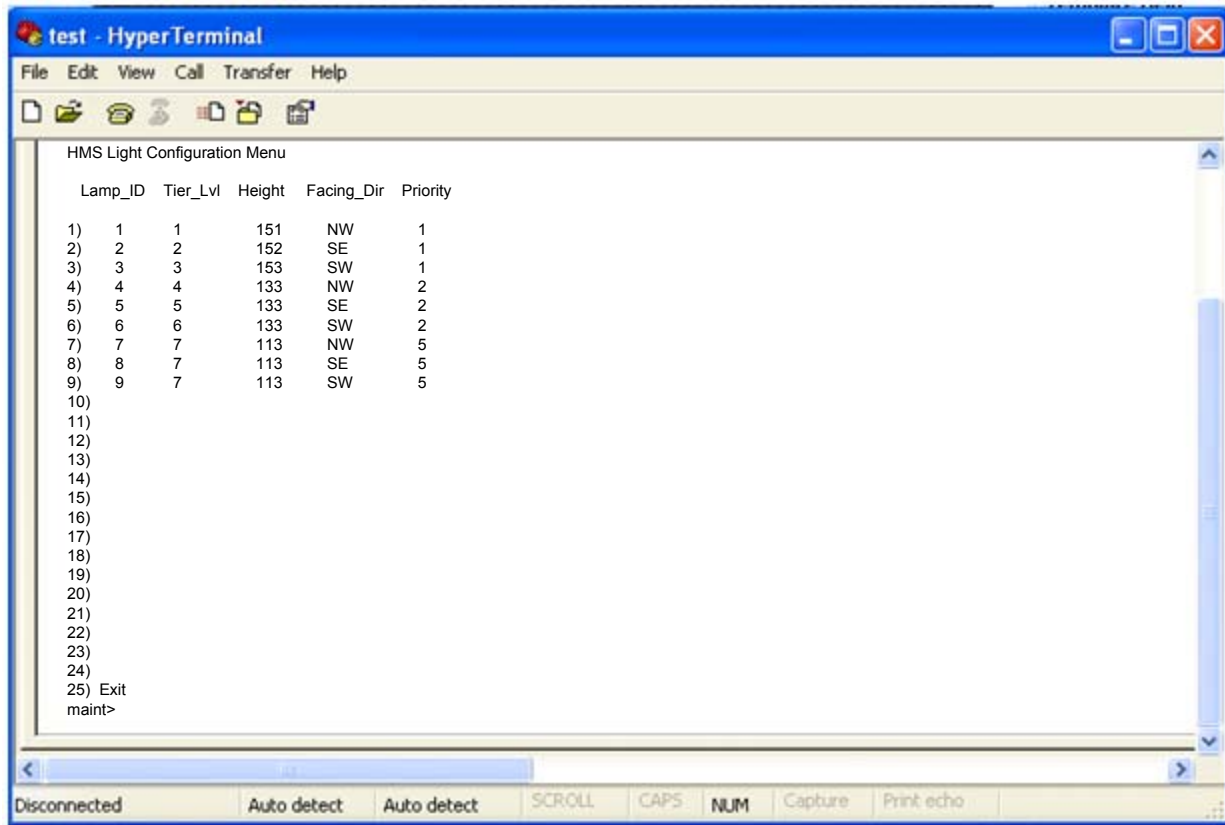
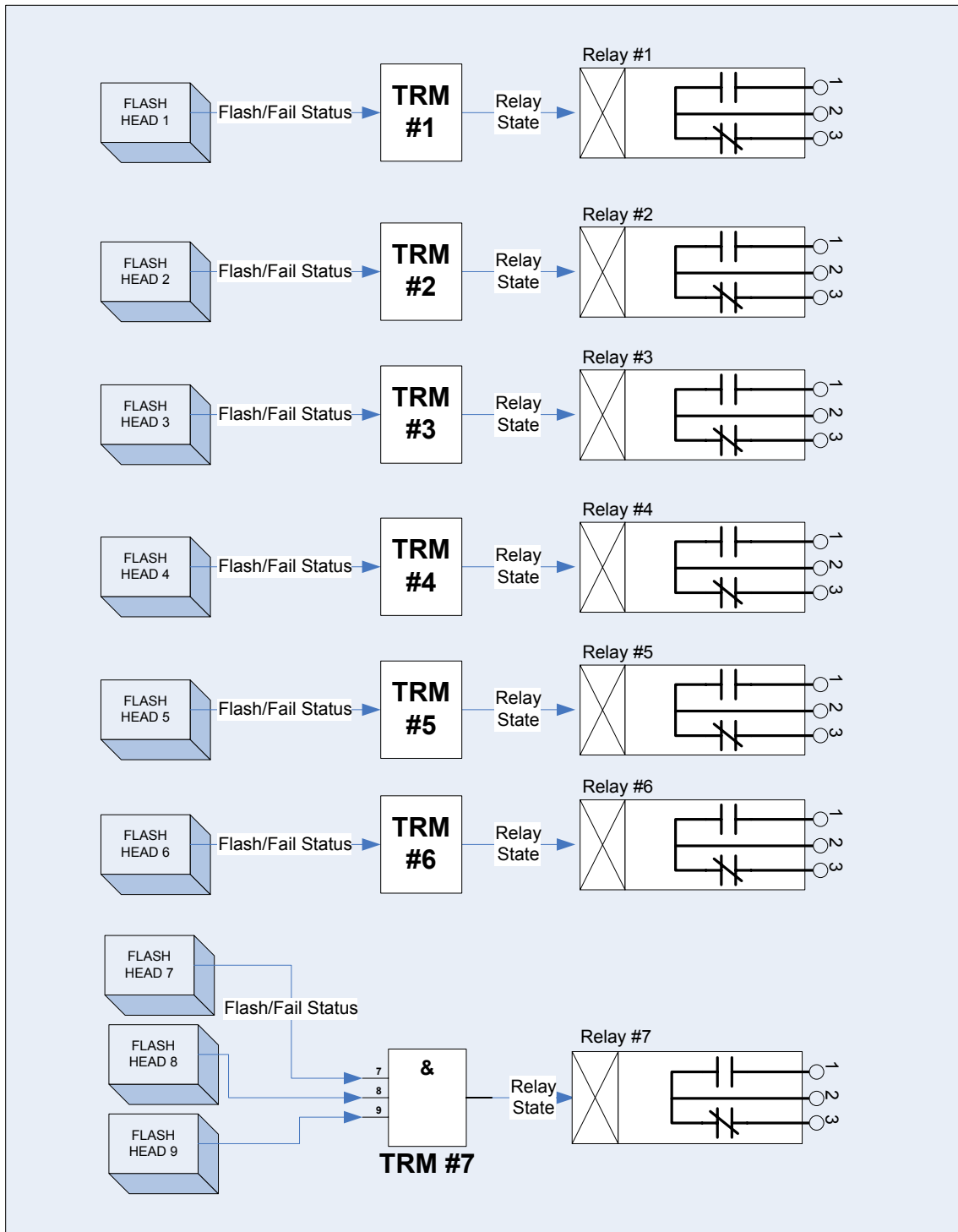**Figure 7.1-2 Light Configuration Menus Settings for 9 Lights and 7 Relay Outputs**

Figure 7.1-3 System Configuration with 9 Flash Heads using 7 relays

A typical configuration would be to create eight tiers (or groups). Each tier would be a collection of three Flash Heads. Each tier's status would be collect by its assigned TRM and then reported by the relay whose number identifies the tier or (TRM) number. The Light Configuration Menu setting would appear as shown in Figure 7.1-4. An alternative view is presented in Figure 7.1-5 which shows the individual groups Flash Head groups reporting status to their assigned TRM which is connected to the reporting relay.
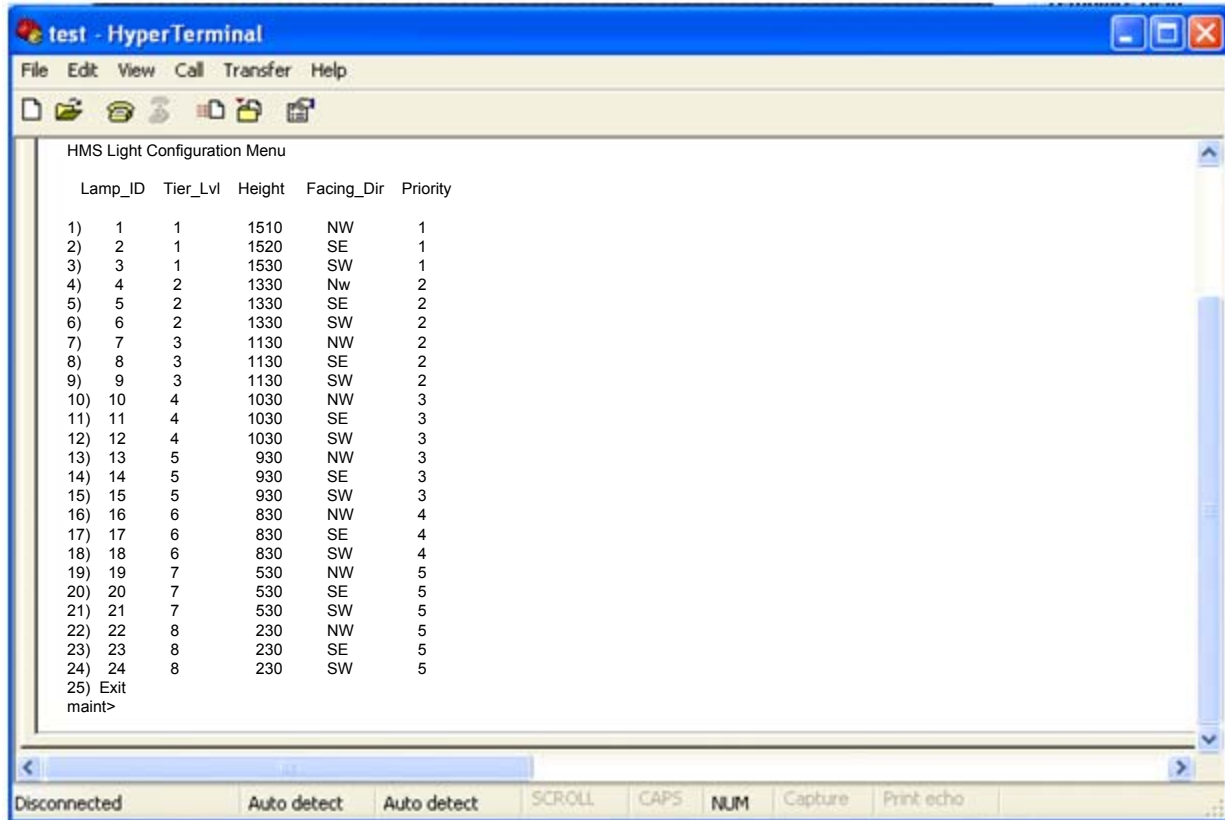

HMS Light Configuration Menu

	Lamp_ID	Tier_Lvl	Height	Facing_Dir	Priority
1)	1	1	1510	NW	1
2)	2	1	1520	SE	1
3)	3	1	1530	SW	1
4)	4	2	1330	Nw	2
5)	5	2	1330	SE	2
6)	6	2	1330	SW	2
7)	7	3	1130	NW	2
8)	8	3	1130	SE	2
9)	9	3	1130	SW	2
10)	10	4	1030	NW	3
11)	11	4	1030	SE	3
12)	12	4	1030	SW	3
13)	13	5	930	NW	3
14)	14	5	930	SE	3
15)	15	5	930	SW	3
16)	16	6	830	NW	4
17)	17	6	830	SE	4
18)	18	6	830	SW	4
19)	19	7	530	NW	5
20)	20	7	530	SE	5
21)	21	7	530	SW	5
22)	22	8	230	NW	5
23)	23	8	230	SE	5
24)	24	8	230	SW	5
25) Exit					

maint>

Figure 7.1-4 Light Configuration Menus Settings for 24 Light and 8 Relay Outputs
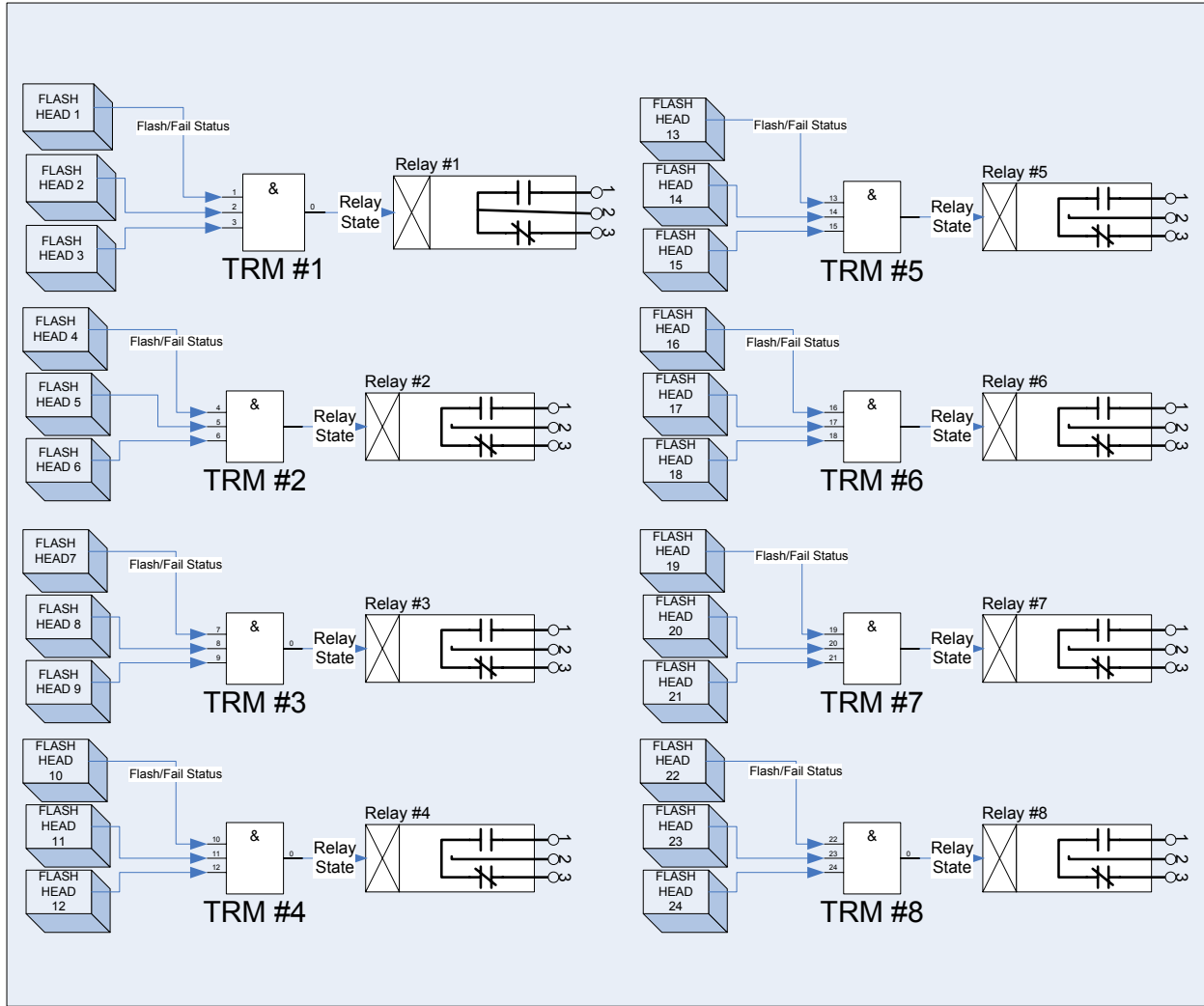
Honeywell

Figure 7.1-5 System Configuration with 24 Flash Heads using 8 relays