

Cooper Industries
Crouse-Hinds Division
Crouse-Hinds Airport Lighting Products
1200 Kennedy Road
Windsor, CT 06095
860 683-4300
Fax 860 683-4354

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Revision E



Title:

INSTRUCTION MANUAL
FAA TYPES L-880 AND L-881
PRECISION APPROACH PATH INDICATOR
SYSTEMS
SERIES 88XA3X-X-XX
PAPI

REV.	DESCRIPTION	LTR.	CHK.	APV
A	Released to Production	A204-256	12/8/04	GFR
B	Updated Figure 4-5; Table 5-2 Item 17 was 27018; Table 5-4, 27192 was 27018	A205-332	9/20/05	GFR
C	Added varistor to figures 2-2, 2-3, 2-4 & 2-6; pg's 6 & 7, 27195 Was 10037-534; pg 5, deleted option 10; pg 3, 1.2.3.1 & pg 25, 3.1.1, -28F was -28D; fig 4-5, reversed lenses 180 degrees, revised filter bracket pictorial and added note to lenses & filter bracket not field replaceable; fig 4-6, view D, revised filter bracket pictorial; table 5-2, added item 16, 17 & 18 not field replaceable and revised item 18 P/N, was 27011; table 5-3, added item 33 not field replaceable & deleted item 19, P/N 27098, qty 3; table 5-4, deleted P/N's 27017 (lens), 27192 (lens retainer) & 10035-46 (lens o-ring); revised title page copyright; deleted Appendix B, lens Replacement; table 3-2, item 11 p/n 27195 was 10037-534	A206-153	10/2/06	PG
D	Figure 2-4, revised 27175-8 diagram connections at TB1; cover page, Copyright 2007 was 2006	A207-131	4/23/07	PG
E	Wire #26 was #17 on figures 2-5, 2-5A, pages 21 & 22 and page 30, 3.1.6.5.2; Updated table 3-3 on page 49; Updated Figure 4-3A on page 58.	A209-063	9/22/09	JRC

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LIMITED PRODUCT WARRANTY

THE FOLLOWING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER EXPRESS, IMPLIED OR STATUTORY, INCLUDING, BUT NOT BY WAY OF LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

Crouse-Hinds Airport Lighting Products (the “Company”) warrants to each original Buyer of Products manufactured by the Company that such Products are, at the time of delivery to the Buyer, free of material and workmanship defects, provided that no warranty is made with respect to:

- (a) any Product which has been repaired or altered in such a way, in Company's judgment, as to affect the Product adversely;
- (b) any Product which has, in Company's judgment, been subject to negligence, accident or improper storage;
- (c) any Product which has not been operated and maintained in accordance with normal practice and in conformity with recommendations and published specification of Company; and,
- (d) any Products, component parts or accessories manufactured by others but supplied by Company (any claims should be submitted directly to the manufacturer thereof).

Crouse-Hinds Airport Lighting Products’ obligation under this warranty is limited to use reasonable efforts to repair or, at its option, replace, during normal business hours at any authorized service facility of Company, any Products which in its judgment proved not to be as warranted within the applicable warranty period. All costs of transportation of Products claimed not to be as warranted and of repaired or replacement Products to or from such service facility shall be borne by Purchaser. Company may require the return of any Product claimed not to be as warranted to one of its facilities as designed by Company, transportation prepaid by Purchaser, to establish a claim under this warranty. The cost of labor for installing a repaired or replacement product shall be borne by Purchaser. Replacement parts provided warranty period of the Products upon which they are installed to the same extent as if such parts were original components thereof. Warranty services provided under the Agreement do not assure uninterrupted operations of Products; Company does not assume any liability for damages caused by any delays involving warranty service. The warranty period for the Products is 24 months from date of shipment or 12 months from date of first use whichever occurs first.

SAFETY NOTICES

This equipment is normally used or connected to circuits that may employ voltages which are dangerous and may be fatal if accidentally contacted by operating or maintenance personnel. Extreme caution should be exercised when working with this equipment. While practical safety precautions have been incorporated in this equipment, the following rules must be strictly observed:

KEEP AWAY FROM LIVE CIRCUITS

Operating and maintenance personnel must at all times observe all safety regulations. **DO NOT PERFORM MAINTENANCE ON INTERNAL COMPONENTS OR RE-LAMP WITH POWER ON.**

RESUSCITATION

Maintenance personnel should familiarize themselves with the technique for resuscitation found in widely published manuals of first aid instructions.

SAFETY SYMBOLS



DANGER

The hazard or unsafe practice will result in severe injury or death.

DANGER:



WARNING

The hazard or unsafe practice could result in severe injury or death.

WARNING:



CAUTION

The hazard or unsafe practice could result in minor injury.

CAUTION:



NOTICE

Possibly dangerous situation, goods might be damaged.

NOTICE:



IMPORTANT

Helpful information.

IMPORTANT:

SECTION 1. GENERAL INFORMATION

1.1 INTRODUCTION

1.1.1 Purpose

This instruction manual provides field support data and information for the FAA Type L-880 and L-881 Precision Approach Path Indicator (PAPI) Systems manufactured by Crouse-Hinds Airport Lighting Products, Windsor, Connecticut, U.S.A. 06095.

1.1.2 Applicability

The data herein is applicable only to system hardware bearing Crouse-Hinds Part Number Series 88XA3X with applicable dash numbers. Refer to Tables 1-1 through 1-5 for complete part number information.

1.2 EQUIPMENT DESCRIPTION

1.2.1 System Components

A PAPI System consists of four identical light units (FAA Type L-880) or two identical light units (FAA Type L-881), a power supply and optional aiming equipment for the light units. The light units may be configured to operate from an FAA Type L-828 Constant Current Regulator (Style B) or from a specially designed Power and Control Unit in accordance with the PAPI specification (Style A). The light units are normally positioned to the left side of a runway and provide the aircraft pilot with visual glideslope guidance information. Since the aiming angle of the light units is critical to proper operation, they may be equipped with a tilt switch mechanism to provide system shutdown in the event a light unit becomes mis-aligned. Reference Figures 2-1 through 2-5.

1.2.1.1 Style A Light Units

Light units of Style A construction are intended for operation from a specially designed Power and Control Unit. They consist of two or four light projectors and a tilt switch mechanism for the unit when specified. A resistance heater is provided in units intended for installation in regions where the temperature may fall below -35 degrees C.

1.2.1.2 Style B Light Units

Light units of Style B construction are intended for operation from an FAA Type L-828 Constant Current Regulator. They consist of two or four light projectors, the tilt switch timing circuit, tilt switch mechanism for the unit when specified, and lamp out circuitry. A resistance heater is provided in units intended for installation in regions where the temperature may fall below -35 degrees C.

1.2.1.3 Power and Control Unit (PCU)

All Style A PAPI Systems are powered by a specially designed Power and Control Unit. This unit provides for accurate regulation of the power supplied to the light units, monitoring of the tilt switch circuitry, photoelectric control of the day and night brightness switching and allows for remote control of the system from a radio controller or the control tower. The Crouse-Hinds Model of the unit employs state-of-the-art technology throughout. Lightning arrestors and transient suppressors are provided. In addition, the PCU contains circuitry to shutdown the PAPI System in the event of an over-voltage in the system.

1.2.1.4 Clinometer

The 25220 Clinometer is used by installation and maintenance personnel for the purpose of aiming the PAPI light units. It is comprised of a precision spirit level and a vernier calibration mechanism. Angles from 0° to 12° can be measured in 1 minute of arc increments. It is not supplied as a part of the system and must be ordered separately.

1.2.2 Application

The PAPI System is a visual landing aid. It provides a white and red signal to the aircraft pilot enabling him to follow the correct approach path to the runway touchdown point. The system does not require instruments in the aircraft and is equally effective by day or night. Any pilot can use the system.

1.2.2.1 Position

This visual aid is located at the side of the runway adjacent to the origin of the glideslope and perpendicular to the runway centerline. The setting angles of the four units are graded. The difference in angle between each PAPI unit is normally 20 minutes of arc.

The nominal glideslope angle is midway between the angular settings of the center of the PAPI Units.

1.2.2.2 Signal Format

A pilot approaching a runway on the correct glideslope will see two red and two white lights in the bar (L-880 System). If the aircraft goes below the glideslope, the pilot sees a progressively increasing number of red lights. Conversely, if the aircraft goes above glideslope the number of white lights seen is increased. See Figure 1.1. and Figure 3-1.

1.2.3 Specifications

1.2.3.1 FAA Classification

Specification: Precision Approach Path Indicator qualified to FAA Advisory Circular AC 150/5345-28F

Type: L-880 4 light unit systems, L-881 - 2 light unit systems

Style: A - Voltage Powered (multiple circuit system)
B - Current Powered (series circuit) systems

Class: I - Operation to -35°C
II - Operation to -55°C

1.2.3.2 Electrical Characteristics

Primary Power:

For PCU: 208-240VAC, 60Hz or 220VAC, 50Hz. Refer to Table on page 26 for information on ampacity according to PCU size and input voltage.

For Style A: PCU for Style A Light Units.

For Style B: 2.8 to 6.6 Amp 50/60 Hz current regulator for Style B Light Units.

1.2.3.3 Physical Characteristics

Dimensional: Refer to Figures 4-1 through 4-5.

Weight:	PCU	27185-3	105 lbs.
	PCU	27185-4	160 lbs.
	Light Housings	27175	88 lbs.

Environmental:

Temperature: -55°C to +55°C
(-67°F to +131°F)

Relative Humidity: 100%

Altitude: Zero to 6,600 ft. (2000M)

1.2.3.4 Installation Requirements

The PAPI System is shipped from the factory complete and ready for installation. The agency responsible for installation must supply all necessary connectors, wire and conduit required for unit interconnection and power feed. The Clinometer (P/N 25220) is not supplied with the PAPI System and must be ordered separately. Only one Clinometer is required per airport. It is recommended that the Clinometer is checked periodically against a good quality carpenter's level or a known leveling surface. Set the vernier adjustment for 0°, 0 minutes and compare the clinometer bubble position to the carpenter's level bubble position or leveling surface. Calibration adjustments of the clinometer must be made by the manufacturer.

1. Read Section 3 carefully. See Figures 3-1 to 3-7 for the wiring applicable to your system. Be sure field wiring diagram matches the part numbers you have ordered.

PART NUMBER TABULATION
PAPI SYSTEMS

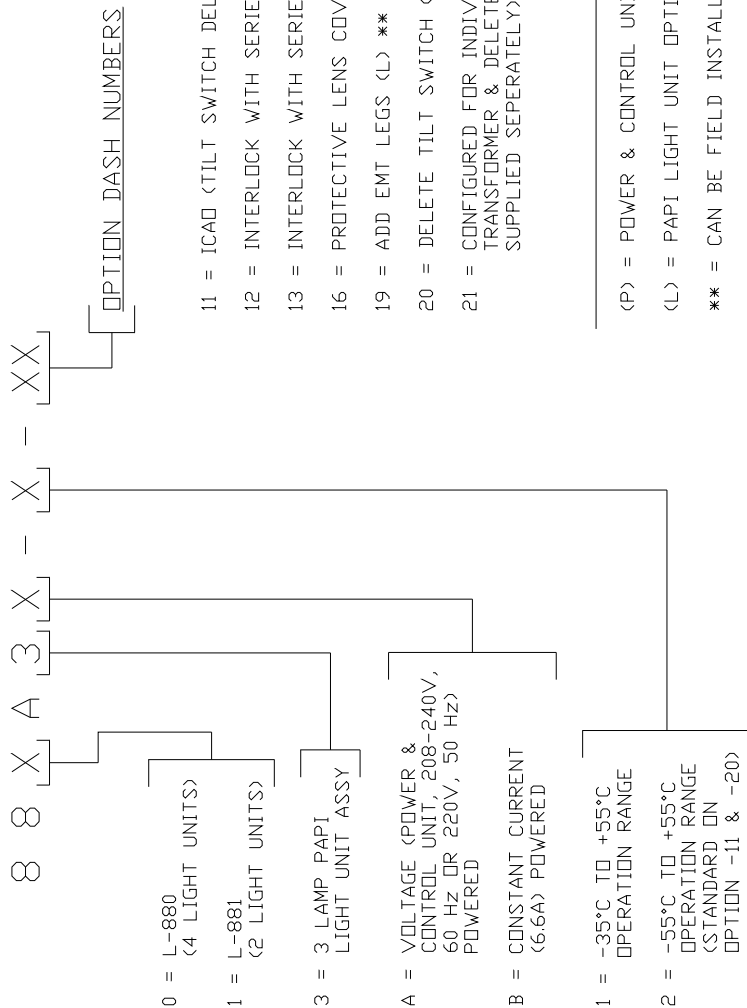


TABLE 1-1

ACCESSORIES (ORDER SEPARATELY)

P/N 25220: PAPI CLINDMETER, ONE REQUIRED PER AIRPORT

L-880 & L-881 STYLE "A" 3-LAMP PAPI SYSTEM

NOTE: Customer must supply voltage between 208 - 240 V, 60 Hz. or 220 V, 50 Hz. to Power & Control Unit Assy.

881A3A-1 CONSISTS OF:

- (1) 27185-3 POWER & CONTROL UNIT ASSY
- (2) 27175-1 PAPI LIGHT UNIT ASSY
- (2) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (2) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (2) 27195 CONSOLIDATING HARNESS
- (1) 27096 HARDWARE KIT - POWER AND CONTROL UNIT

881A3A-2 CONSISTS OF:

- (1) 27185-3 POWER & CONTROL UNIT ASSY
- (2) 27175-2 PAPI LIGHT UNIT ASSY
- (2) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (2) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (2) 27195 CONSOLIDATING HARNESS
- (1) 27096 HARDWARE KIT - POWER AND CONTROL UNIT

881A3A-2-11 OR -20 CONSISTS OF:

- (1) 27185-3 POWER & CONTROL UNIT ASSY
- (2) 27175-7 PAPI LIGHT UNIT ASSY
- (2) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (2) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (2) 27195 CONSOLIDATING HARNESS
- (1) 27096 HARDWARE KIT - POWER AND CONTROL UNIT

880A3A-1 CONSISTS OF:

- (1) 27185-4 POWER & CONTROL UNIT ASSY
- (4) 27175-1 PAPI LIGHT UNIT ASSY
- (4) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (4) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (4) 27195 CONSOLIDATING HARNESS
- (1) 27096 HARDWARE KIT - POWER AND CONTROL UNIT

L-880 & L-881 STYLE "A" 3-LAMP PAPI SYSTEM (cont.)

880A3A-2 CONSISTS OF:

- (1) 27185-4 POWER & CONTROL UNIT ASSY
- (4) 27175-2 PAPI LIGHT UNIT ASSY
- (4) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (4) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (4) 27195 CONSOLIDATING HARNESS
- (1) 27096 HARDWARE KIT - POWER AND CONTROL UNIT

880A3A-2-11 OR -20 CONSISTS OF:

- (1) 27185-4 POWER & CONTROL UNIT ASSY
- (4) 27175-7 PAPI LIGHT UNIT ASSY
- (4) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (4) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (4) 27195 CONSOLIDATING HARNESS
- (1) 27096 HARDWARE KIT - POWER AND CONTROL UNIT

NOTE: On Power & Control Unit Assy which is used with Light Unit Assy with no Tilt Switch (Option -11 or -20), a jumper wire (#16 AWG min) must be added between TB1 terminals Tilt Switch A & B for Unit to function.

L-880 & L-881 STYLE "B" 3-LAMP PAPI SYSTEM

NOTE: Customer must supply 6.6 AMPS Constant Current to Papi Light Unit Assy

881A3B-1 CONSISTS OF:

- (1) 27175-3 PAPI LIGHT UNIT ASSY (MASTER)
- (1) 27175-5 PAPI LIGHT UNIT ASSY (SLAVE)
- (4) 33010 300W, 6.6/6.6A ISOLATION TRANSFORMER (MASTER (2)
SLAVE (2))
- (1) 33004 100W, 6.6/6.6A ISOLATION TRANSFORMER (FOR MASTER)
- (2) 823KP-D4-D4 L-823 CONNECTOR KIT
- (2) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (2) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (1) 27068-1 CONSOLIDATING HARNESS (FOR SLAVE)
- (1) 27068-3 CONSOLIDATING HARNESS (FOR MASTER)

L-880 & L-881 STYLE "B" 3-LAMP PAPI SYSTEMS (cont.)

881A3B-2 CONSISTS OF:

- (1) 27175-4 PAPI LIGHT UNIT ASSY (MASTER)
- (1) 27175-6 PAPI LIGHT UNIT ASSY (SLAVE)
- (4) 33010 300W, 6.6/6.6A ISOLATION TRANSFORMER (MASTER (2)
SLAVE (2))
- (1) 33004 100W, 6.6/6.6A ISOLATION TRANSFORMER (FOR MASTER)
- (2) 823KP-D4-D4 L-823 CONNECTOR KIT
- (2) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (2) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (1) 27068-1 CONSOLIDATING HARNESS (FOR SLAVE)
- (1) 27068-3 CONSOLIDATING HARNESS (FOR MASTER)

881A3B-2-11 OR -20 CONSISTS OF:

- (2) 27175-8 PAPI LIGHT UNIT ASSY
- (4) 33010 300W, 6.6/6.6A ISOLATION TRANSFORMER
- (2) 823KP-D4-D4 L-823 CONNECTOR KIT
- (2) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (2) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (2) 27068-2 CONSOLIDATING HARNESS

881A3B-2-21 CONSISTS OF:

- (2) 27175-9 PAPI LIGHT UNIT ASSY
- (2) 823KP-D4-D4 L-823 CONNECTOR KIT
- (2) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (2) 27135 POWER ENTRY KIT
- (1) 2439 MANUAL

880A3B-1 CONSISTS OF:

- (1) 27175-3 PAPI LIGHT UNIT ASSY (MASTER)
- (3) 27175-5 PAPI LIGHT UNIT ASSY (SLAVE)
- (8) 33010 300W, 6.6/6.6A ISOLATION TRANSFORMER (MASTER (2)
SLAVE (6))
- (1) 33004 100W, 6.6/6.6A ISOLATION TRANSFORMER (FOR MASTER)
- (4) 823KP-D4-D4 L-823 CONNECTOR KIT
- (4) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (4) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (1) 27068-3 CONSOLIDATING HARNESS (FOR MASTER)
- (3) 27068-1 CONSOLIDATING HARNESS (FOR SLAVE)

L-880 & L-881 STYLE "B" 3-LAMP PAPI SYSTEMS (cont.)

880A3B-2 CONSISTS OF:

- (1) 27175-4 PAPI LIGHT UNIT ASSY (MASTER)
- (3) 27175-6 PAPI LIGHT UNIT ASSY (SLAVE)
- (8) 33010 300W, 6.6/6.6A ISOLATION TRANSFORMER (MASTER (2)
SLAVE (6))
- (1) 33004 100W, 6.6/6.6A ISOLATION TRANSFORMER (FOR MASTER)
- (4) 823KP-D4-D4 L-823 CONNECTOR KIT
- (4) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (4) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (1) 27068-3 CONSOLIDATING HARNESS (FOR MASTER)
- (3) 27068-1 CONSOLIDATING HARNESS (FOR SLAVE)

880A3B-2-11 OR -20 CONSISTS OF:

- (4) 27175-8 PAPI LIGHT UNIT ASSY
- (8) 33010 300W, 6.6/6.6A ISOLATION TRANSFORMER
- (4) 823KP-D4-D4 L-823 CONNECTOR KIT
- (4) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (4) 27102 POWER ENTRY KIT
- (1) 2439 MANUAL
- (4) 27068-2 CONSOLIDATING HARNESS

880A3B-2-21 CONSISTS OF:

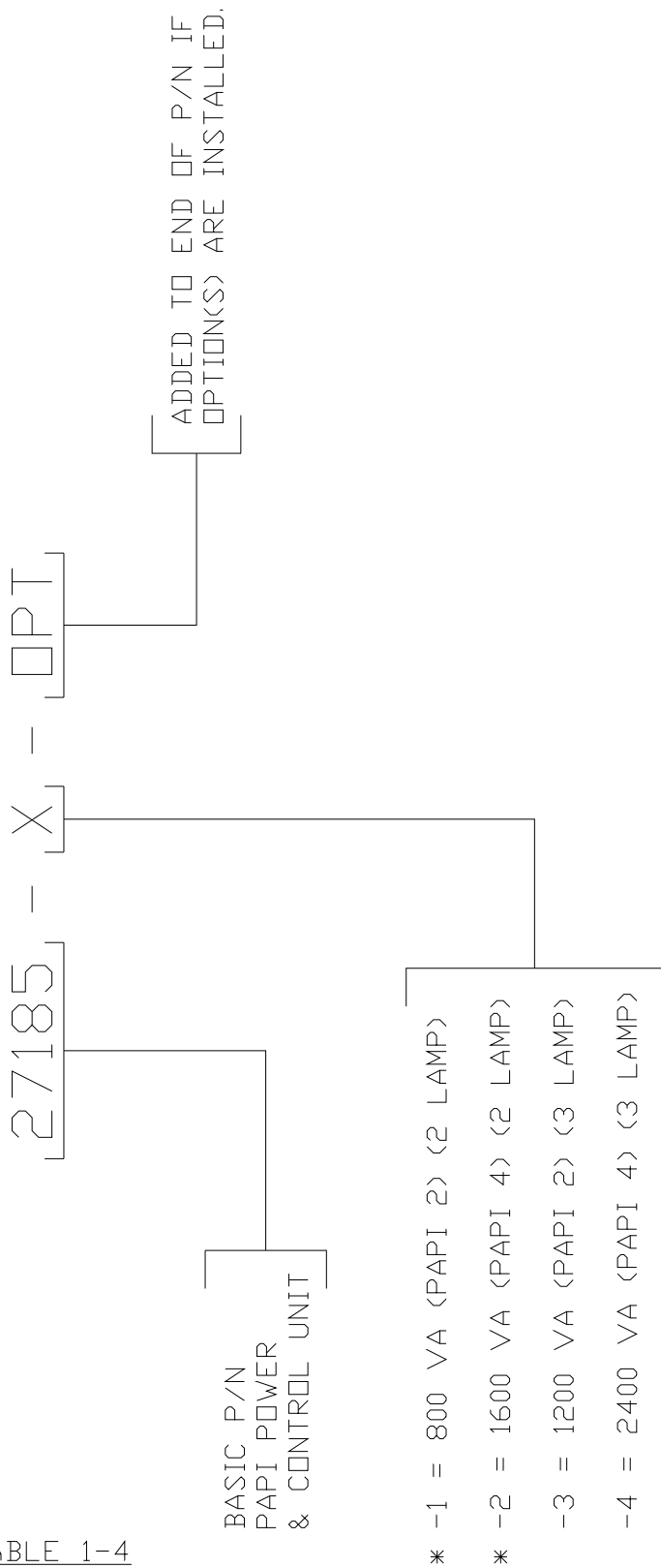
- (4) 27175-9 PAPI LIGHT UNIT ASSY
- (4) 823KP-D4-D4 L-823 CONNECTOR KIT
- (4) 27184 HARDWARE KIT - PAPI LIGHT UNIT
- (4) 27135 POWER ENTRY KIT
- (1) 2439 MANUAL

NOTE: All "MASTER" Style "B" 3-Lamp Papi Light Unit Assy's require two 300W, 6.6/6.6A Isolation Transformers, P/N 33010 and one 100W, 6.6/6.6A Isolation Transformer, P/N 33004. All other Style "B" 3-Lamp PAPI Light Unit Assy's require two (each) 300W, 6.6/6.6A Isolation Transformers, P/N 33010. Each L-881 Style "B" system uses 2 L-823 connector kits, P/N 823KP-D4-D4 for L-824 Type C #8 AWG cable. Each L-880 Style "B" system uses 4 L-823 Connector Kits, 823KP-D4-D4 for L-824 Type C #8 AWG cable.

All Opt -21 units require (3) 200W, 6.6/6.6A CSA certified, Grounded Isolation Transformers per PAPI Light Unit.

PART NUMBER TABULATION
POWER & CONTROL UNIT ASSY

TABLE 1-4



NOTE:
* = FOR REF. ONLY. SEE DOCUMENT 2438.

PART NUMBER TABULATION
PAPI LIGHT UNIT ASSY

27175 - X - OPT

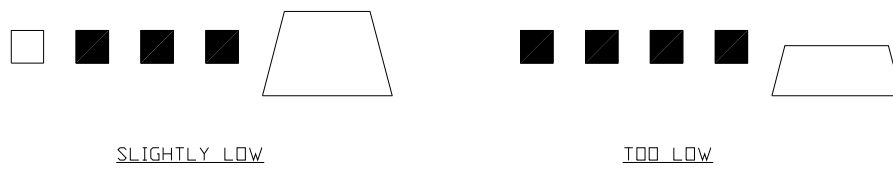
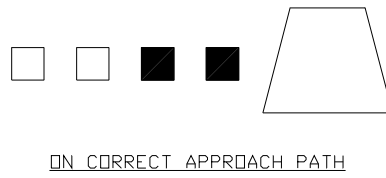
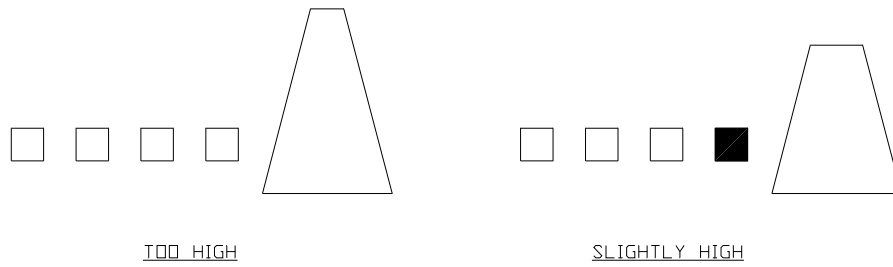
BASIC PART NO.
PAPI LIGHT UNIT

- 1 = STYLE A, CLASS I
- 2 = STYLE A, CLASS II
- 3 = STYLE B, CLASS I "MASTER"
- 4 = STYLE B, CLASS II "MASTER"
- 5 = STYLE B, CLASS I "SLAVE"
- 6 = STYLE B, CLASS II "SLAVE"
- 7 = STYLE A, CLASS II WITHOUT TILT SWITCH
- 8 = STYLE B, CLASS II WITHOUT TILT SWITCH
- 9 = STYLE B, CLASS II WITHOUT TILT SWITCH &
LAMP BYPASS

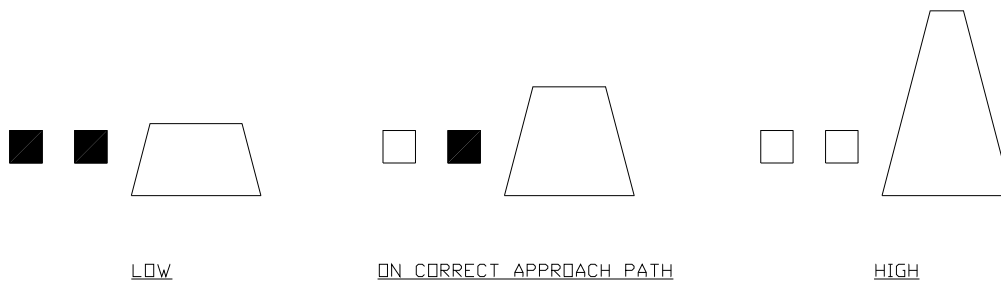
REF: STYLE A = VOLTAGE (PCU) POWERED
STYLE B = CURRENT POWERED
CLASS I = OPERATION TO -35°C
CLASS II = OPERATION TO -55°C

ADDED TO END OF P/N IF
OPTION(S) ARE INSTALLED.

TABLE 1-5



L-880 SYSTEM



L-881 SYSTEM

PAPI SYSTEM SIGNALS

SEE AC 150/5345-28 FOR COMPUTATION OF AIMING ANGLE

FIGURE 1-1

SECTION 2. TECHNICAL DESCRIPTION

2.1 THEORY OF OPERATION

The technical discussion herein pertains to all PAPI Systems. Models with options may deviate somewhat from the standard operational description presented, however, the fundamental operating principles are the same.

2.1.1 Optics

The PAPI Light Unit has three Optical Systems. When viewed from a distance, the projected light beams appear as a short horizontal bar. Each Optical System contains a lamp, reflector, color filter and lens.

The light beam travels from the reflector through the color filter to the lens. Light rays leaving the lens converge on a point approximately 6 inches beyond it. This causes the image of the filter to invert, thereby placing it at the bottom of the beam.

The edge of the color filter is precision ground. It is used to provide a very sharp transition between the white and red portions of the beam.

2.1.2 Light Housings

2.1.2.1 Style A Systems

All PAPI Projectors are not electrically identical. Projectors may not be interchanged between Style A and Style B Systems. The light unit housings contain the electrical circuitry required for their operation. In addition to the standard optics, the projector housing contains (when specified) the tilt switch mechanism.

2.1.2.2 Style B Systems

Style B Systems contain (when specified) the same tilt switch mechanism as the Style A systems. In addition, the box contains tilt switch time delay circuitry and a solid-state lamp bypass system. (Reference Figure 2-6). In addition, the "Master" Unit would contain a small current transformer.

2.1.2.3 Tilt Switch Operation

The tilt switch mechanism is factory adjusted to open circuit if the light unit becomes mis-aligned more than 1/2 degree down or 1 degree up. On Style A Systems, the tilt switch loop is terminated at the PCU and operates at 12VDC. In Style B Systems, the tilt switch loop terminates at the Master Light Unit and operates at 20 to 50 mA.

2.1.2.3 Tilt Switch Operation (Cont'd)

The tilt switch time delay is activated when the tilt switch loop opens. The open circuit removes power from a delayed turn-off relay. The relay delay, in the range of 10 to 30 seconds, is sufficient to preclude erroneous shutdown due to wind buffeting and the like. At the end of the delay period, circuitry is energized to effectively short circuit the projector lamps on Style B Units. On Style A Systems, the PCU acts to turn off the power to the light units. Restoring continuity to the tilt switch loop will re-energize the lamps in a few seconds.

PAPI Systems for operation down to -55 degrees C have tilt switch mechanisms equipped with a resistive heater and thermal switch. The heater prevents the mercury in the tilt switch capsules from freezing, while the thermal switch disables the heater in more temperate weather.

2.1.3 PCU Circuit Operation

2.1.3.1 Voltage Regulation

The Power and Control Unit consists of either a 1800VA or 2800VA multiple tap transformer, together with the necessary controls and protective devices. These multiple tap transformers are adjustable to provide a nominal lamp socket voltage of 30.3V high intensity and a choice of 19.5V or 12.5V low intensity. Burn out of any of the lamps will not effect the operation of the remaining lamps, however, the voltage may rise slightly.

2.1.3.2 Photocell Control

When the CB1 circuit breaker is turned on, the PAPI Unit will automatically turn on to low intensity for approximately 45-75 seconds. If the level of light striking the photocell is above 55 foot candles, the PCU will then switch to 100% brightness. If the light level is below 35 foot candles, the PCU will remain in the low intensity setting. After initial turn on, a delay of 45 to 75 seconds is imposed on changes in brightness to prevent switching due to shadows or reflections.

2.1.4 Remote Control Operation

- A) The PCU may be operated remotely by connecting a switch between the remote terminals on TB1. This switch, when turned on, will turn control of the PCU over to the photocell with a response as discussed in Section 2.1.3.2.

2.1.5 Protective Systems (Style A Systems)

2.1.5.2 Tilt Switch Protection

During the normal course of airport operations, a PAPI Light Unit may become misaligned. Light units are equipped with a tilt switch mechanism except for Options -11 and -20. The wires of this mechanism are connected to the PCU at terminals "TILTA" and "TILTB". When a light unit becomes tilted, the PCU waits approximately 10-30 seconds before de-energizing the main contactor. To re-energize the system, the faulty light unit must be realigned and the circuit breaker CB1 must be cycled to restore operation.

2.1.5.3 Transient Protection

The PCU incorporates devices for protection against transients from lightning or other sources. Lightning arrestor LA1 provides protection on the input power lines. Varistors are provided on the remote and tilt lines to protect the control circuitry from transients. Because lightning is a naturally occurring phenomenon that varies with geographic location, it is recommended that each installation be evaluated to determine the need for additional lightning protection.

2.1.6 Protective System (Style B Systems)

2.1.6.1 Tilt Switch Protection

During the normal course of airport operations, a PAPI Light Unit may become misaligned. Light units are equipped with a tilt switch mechanism except for Options -11 and -20. The wires of this mechanism are connected to the circuit board located in the light unit. When a light unit becomes tilted, the board circuitry waits approximately 10-30 seconds before placing a short across the lamps. To re-energize the system, the tilted light unit must be realigned.

2.1.6.2 Lamp Bypass Protection

The three lamps in each light unit are connected in series. In the event one lamp fails, an electronic bypass circuit activates to maintain the series circuit. When the failed lamp is replaced, the electronic bypass resets automatically.

2.1.7 PAPI Circuit Boards - LED Definitions

The PAPI System makes extensive use of Light Emitting Diodes (LED) to aid in performance evaluation and troubleshooting. These LED's are designed for long life and should never require replacement. A list of LED's and what they indicate follows. For detailed use in troubleshooting, refer to Section 4.

2.1.7.1 27138 PCU Control (Figure 2-7)

2.1.7.1.1 DS1: Power Indicator

The DS1 will be lit if the PAPI PCU has proper power applied and CB1 has been turned on. It's being on indicates there is power to the control board and the circuit is functional.

2.1.7.1.2 DS2: Remote Control On Indicator

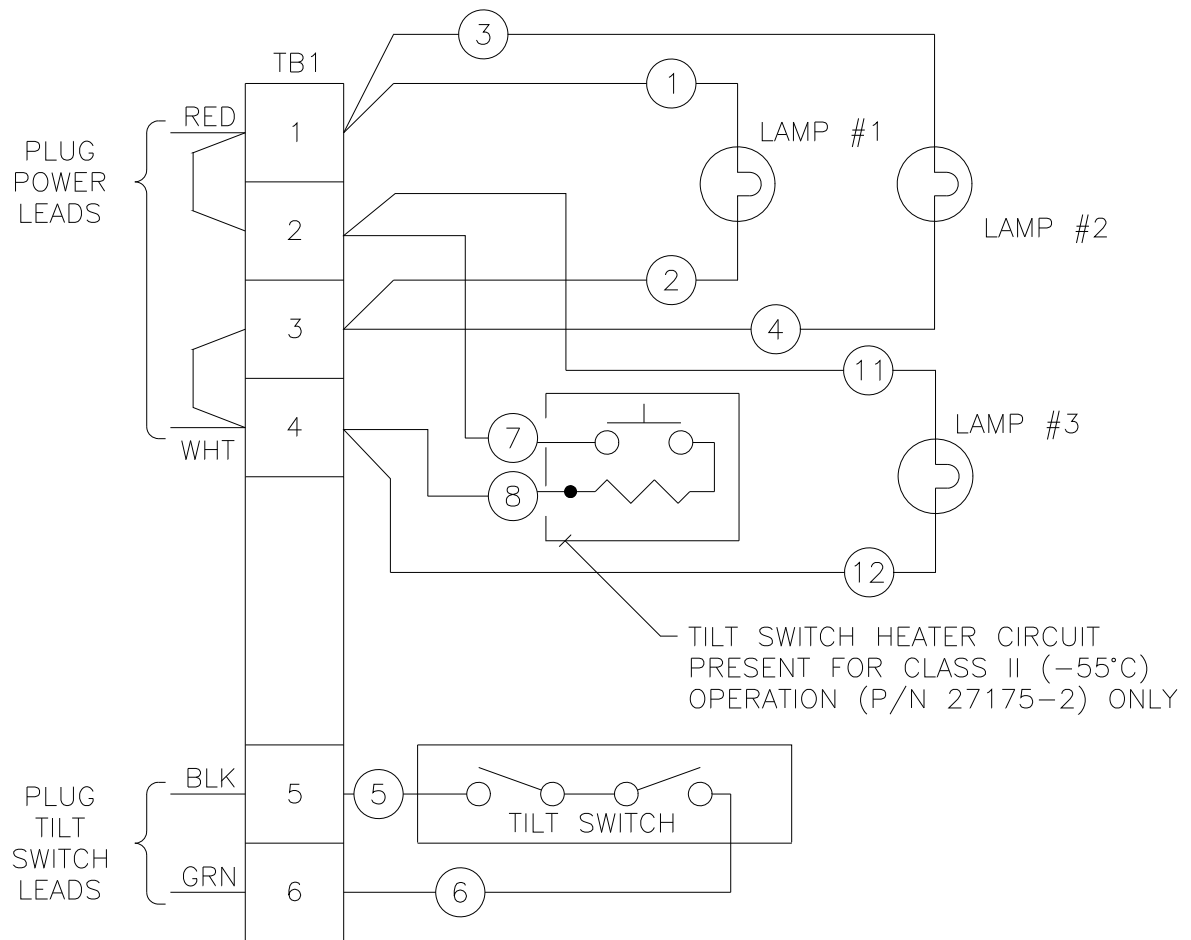
The DS2 will be lit when the unit is commanded on by the closing of the remote control switch.

2.1.7.1.3 DS3: Photocell Day/Night Indicator

The DS3 will be lit to correspond to the photocell sensing a night condition which will cause the lamp intensity to be low. Correspondingly, DS3 will be off to indicate the photocell sensing a day condition which will cause lamp intensity to be high. There is a delay of approximately 45-75 seconds before the unit will switch intensity after sensing a change in day or night.

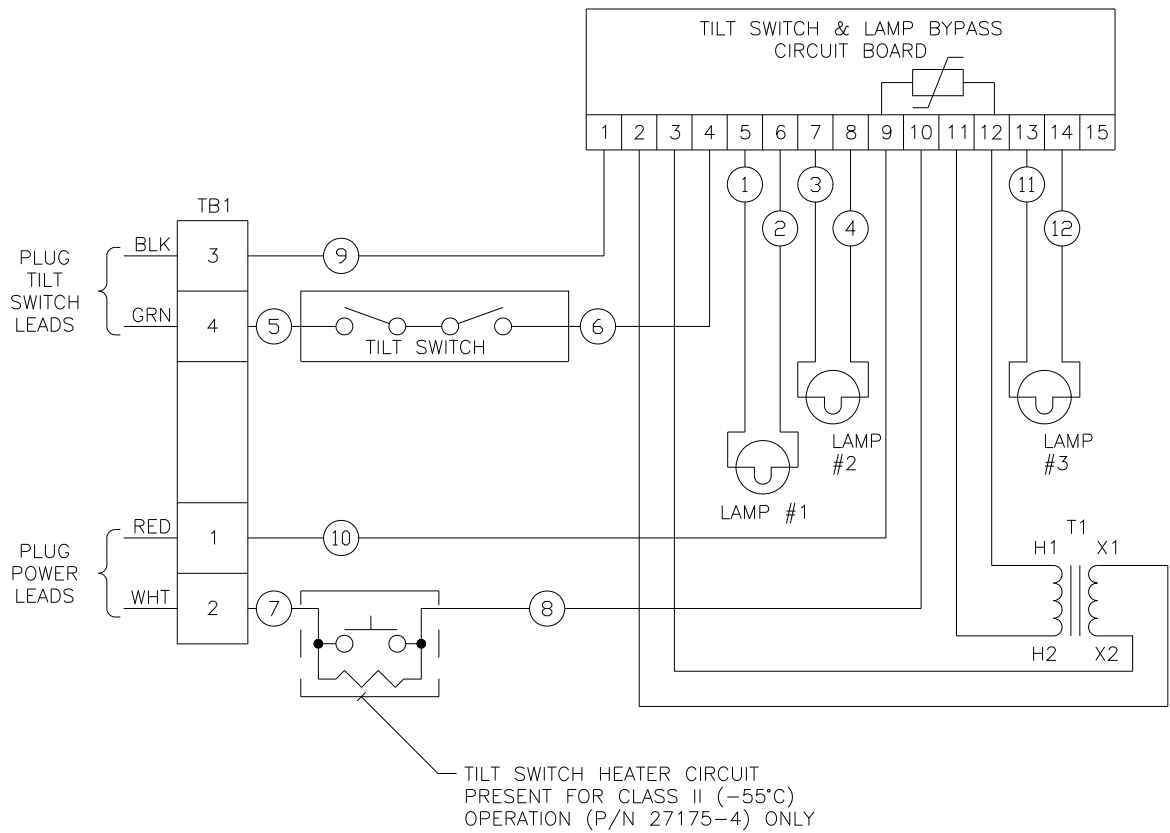
2.1.7.1.4 DS4: Tilt Switch Indicator

The DS4 will be lit to indicate tilt switch circuit is complete. The LED will go out automatically with a tilt switch circuit failure, i.e. the projector unit becomes misaligned. When a failure occurs, the unit will continue to function until the timeout circuitry has disabled it. The timing for this function is 20 seconds +/- 10 seconds.



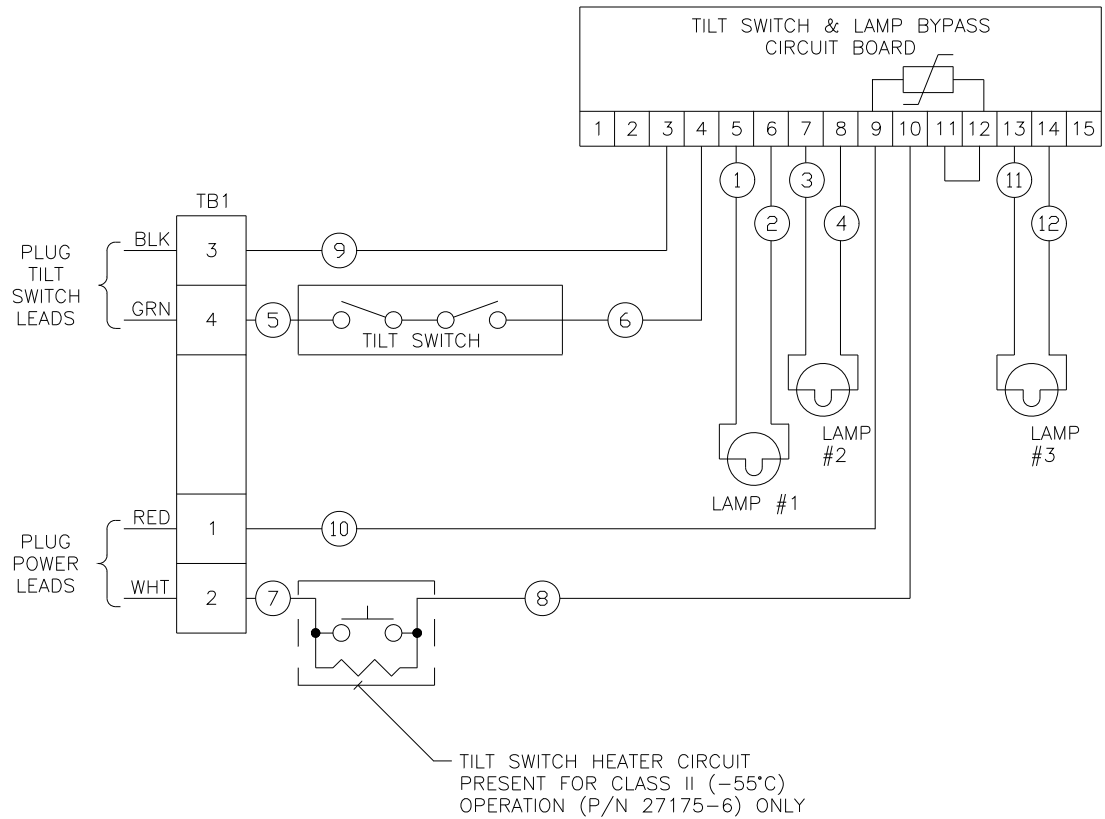
WIRING DIAGRAM
FOR P/N 27175-1 & 27175-2
STYLE A (VOLTAGE POWERED) LIGHT UNIT
WITH TILT SWITCH

SYSTEM WIRING DIAGRAM
PAPI LIGHT UNIT ASSY
FIGURE 2-1



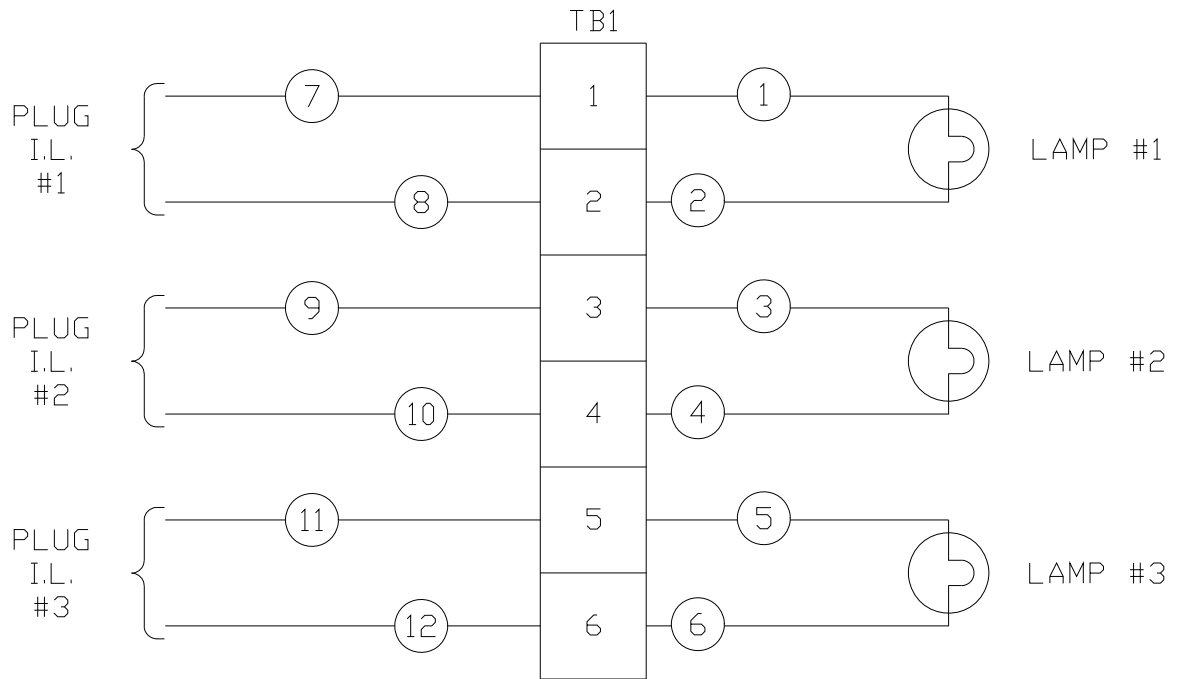
WIRING DIAGRAM
FOR P/N 27175-3 & 27175-4
STYLE B (CURRENT POWERED) MASTER LIGHT UNIT
WITH TILT SWITCH

SYSTEM WIRING DIAGRAM
PAPI LIGHT UNIT ASSY
FIGURE 2-2



WIRING DIAGRAM
FOR P/N 27175-5 & 27175-6
STYLE B (CURRENT POWERED) SLAVE LIGHT UNIT
WITH TILT SWITCH

SYSTEM WIRING DIAGRAM
PAPI LIGHT UNIT ASSY
FIGURE 2-3



WIRING DIAGRAM
FOR P/N 27175-9
STYLE B (CURRENT POWERED) LIGHT UNIT
WITHOUT TILT SWITCH AND LAMP BY-PASS

SYSTEM WIRING DIAGRAM
PAPI LIGHT UNIT ASSY
FIGURE 2-4A

NOTICE: WIRE #26 HAS BEEN FACTORY PRE-SET TO T1-H8 (235-245V) TERMINAL. CHANGE WIRE #26 TERMINATION SUCH THAT THE PAPI LAMP VOLTAGE IS BETWEEN 29.4 AND 31.2 VOLTS.

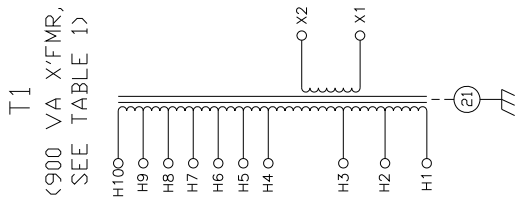


TABLE 1
(REFERENCE ONLY)

LINE VOLTAGE	CONNECT WIRE #26 TO
195-205	H4
205-215	H5
215-225	H6
225-235	H7
235-245	H8
245-255	H9
255-265	H10

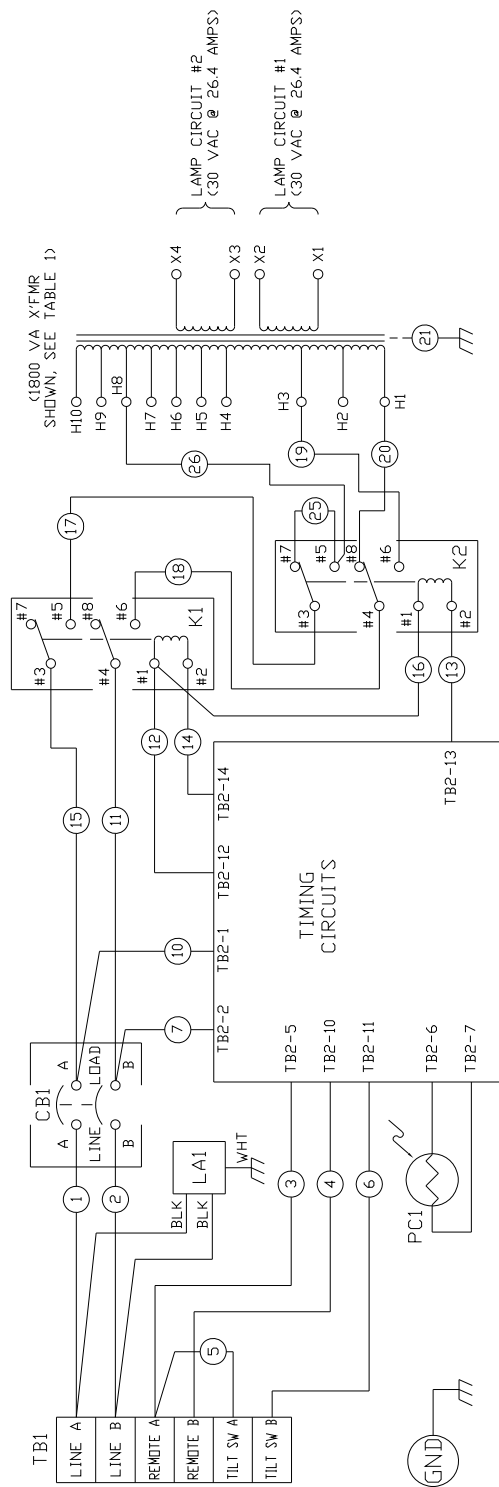


FIGURE 2-5

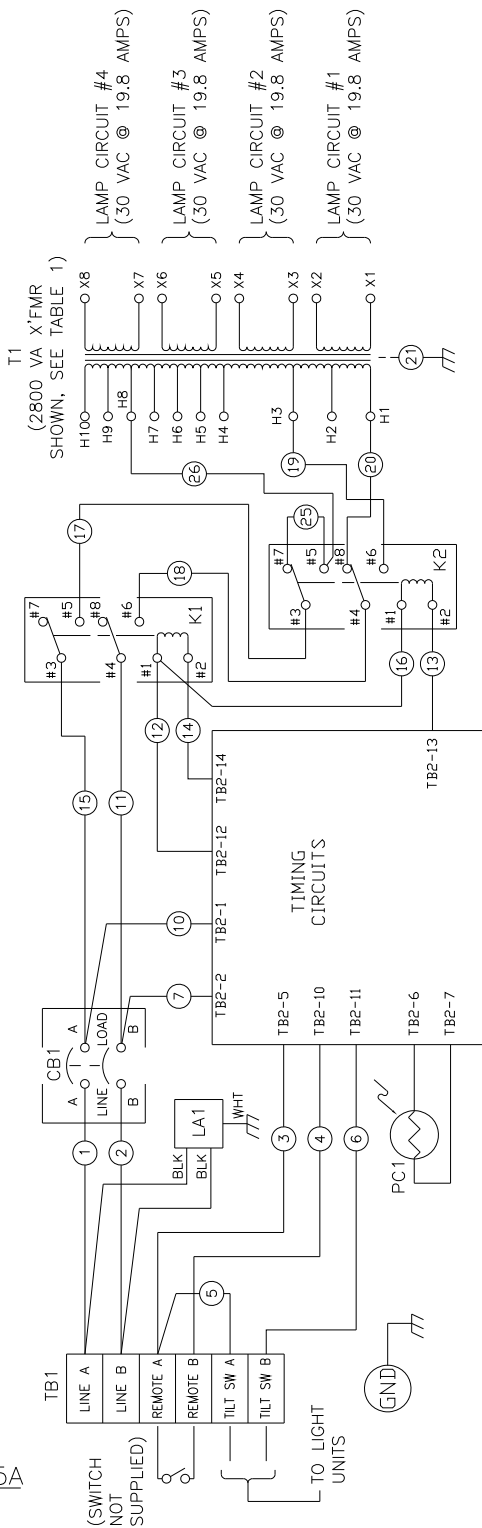
SYSTEM WIRING DIAGRAM
POWER & CONTROL UNIT ASSY

NOTICE: WIRE #26 HAS BEEN FACTORY
PRE-SET TO T1-H8 (235-245V)
TERMINAL. CHANGE WIRE #26
TERMINATION SUCH THAT THE
PAPI LAMP VOLTAGE IS BETWEEN
29.4 AND 31.2 VOLTS.

TABLE 2
(REFERENCE ONLY)

LINE VOLTAGE	CONNECT WIRE #26 TO
195-205	H4
205-215	H5
215-225	H6
225-235	H7
235-245	H8
245-255	H9
255-265	H10

FIGURE 2-5A



SYSTEM WIRING DIAGRAM
POWER & CONTROL UNIT ASSY 27185-4

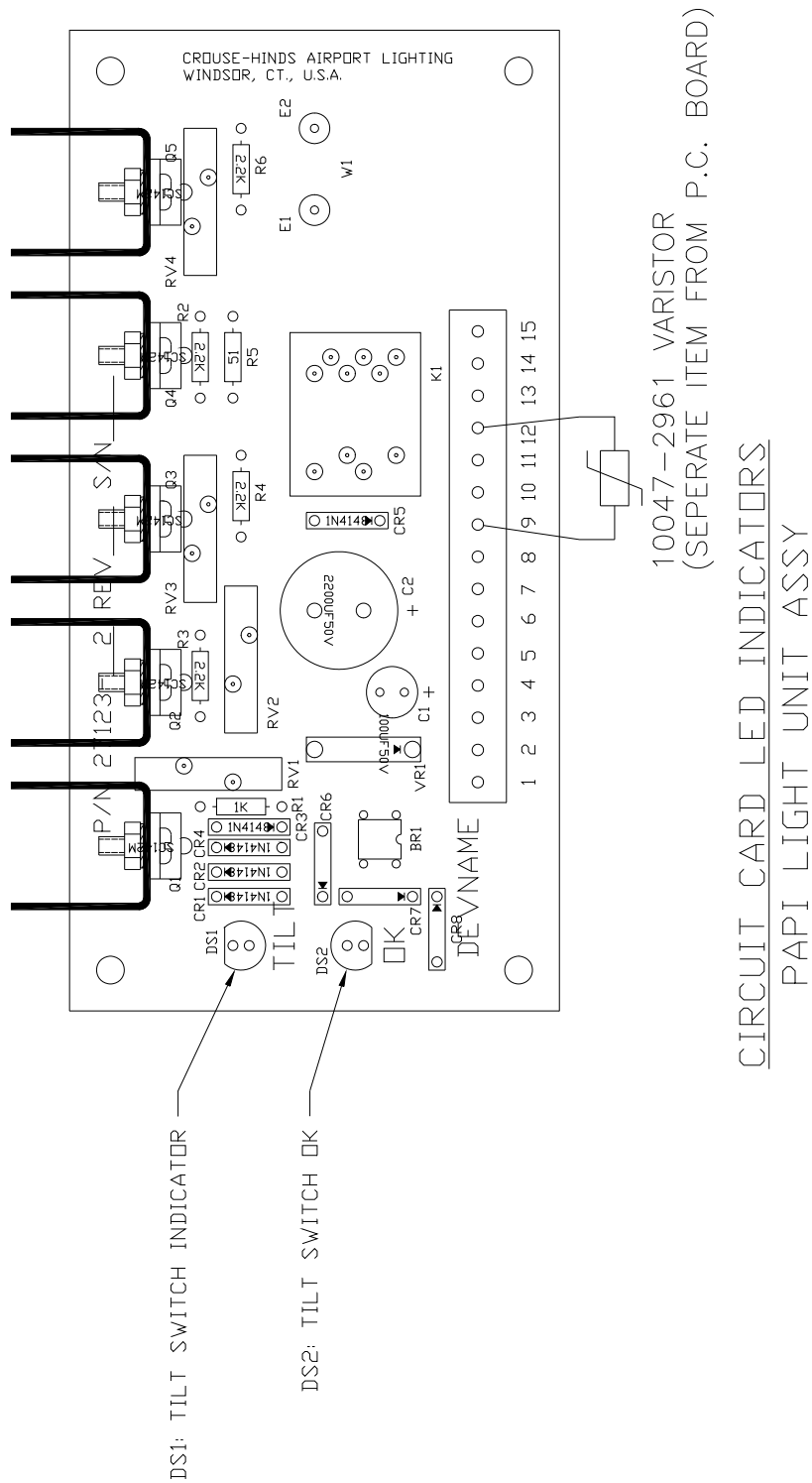


FIGURE 2-6

NOTICE: CIRCUIT CARD, P/N 27123-2 PRESENT IN STYLE "B" LIGHT UNITS WITH TILT SWITCH ONLY

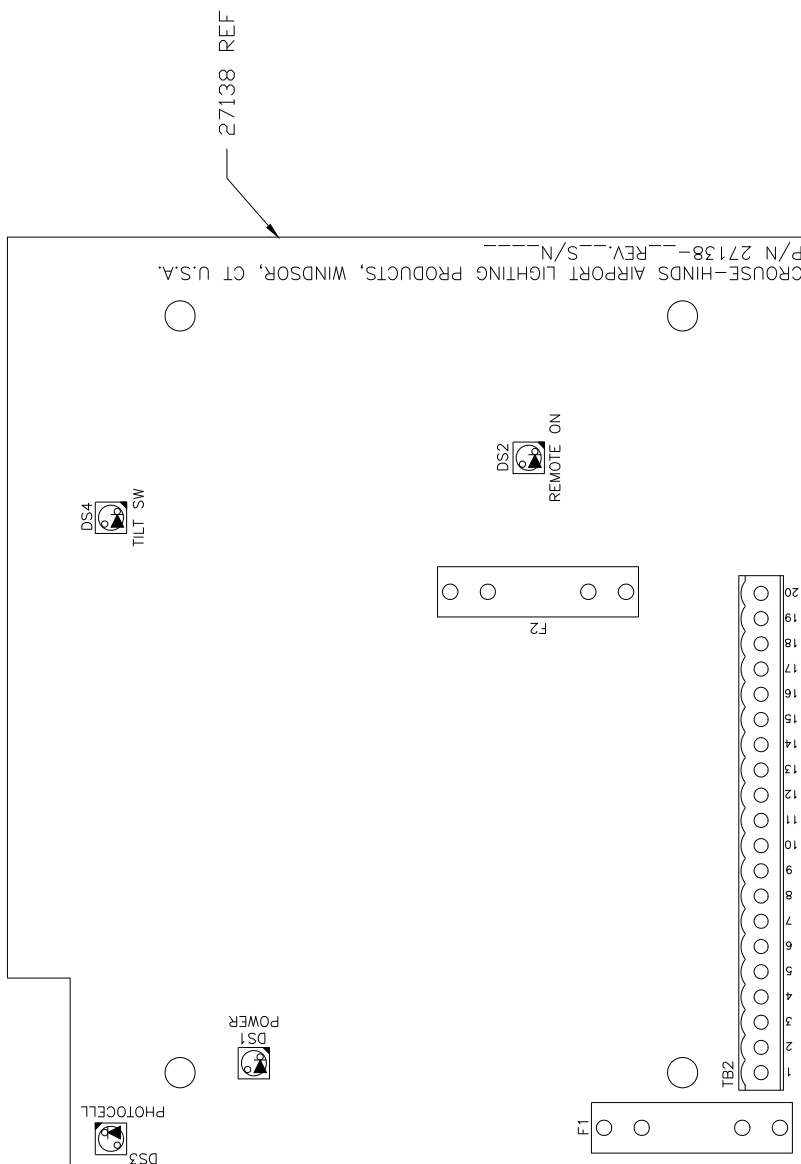


FIGURE 2-7

SECTION 3. INSTALLATION AND CHECKOUT



WARNING

WARNING:

Installation, service, maintenance, or operation should be performed by qualified personnel only.

3.1 INSTALLATION

The PAPI System is supplied ready for operation. When properly connected, no electrical adjustments should be necessary prior to use.

3.1.1 Location

The PAPI System is normally installed to the left of the runway. Figure 3-1 can be used as a sighting aid. It is strongly recommended that the standards of FAA Advisory Circular 150/5345-28F, Chapter 2, be used as the primary installation reference.

3.1.2 Installation Details

Typical details are provided in Figure 3-2 through 3-12 for recommended light unit installation schemes. Tables 3-1 through 3-3 list the hardware required.

3.1.3 Site Preparations

To maintain the inherent precision of a PAPI System, it is essential that the units be rigidly mounted and stable. The following instructions for the preparation of the concrete mounting pads have been found satisfactory in ground of average stability. In extreme cases of unstable ground conditions, it may be necessary to increase the dimensions of the pads or reinforce them with suitable piles driven into the ground. Local experience will be a useful guide in such circumstances.

In most cases, it is acceptable to mount the units on concrete pads whose surface is just below ground level e.g. at the base of turf. Some authorities do, however, demand that any concrete "in the soft" should be at least 12 inches (300 mm) below ground level, with infill of stone chip or other material to ground level. These instructions illustrate the former, "ground level" pads.

3.1.3.1 Preparation of Concrete Pads

- a) Mark the site with suitable pegs at the center of each unit.
- b) Prepare the foundation for each unit, as shown in the applicable figures.
- c) Each hole should then be filled with good quality concrete to the top of the soil level and smoothed off.

3.1.3.1 Preparation of Concrete Pads (Cont'd)

- d) While the concrete is still wet, a wooden template complete with foundation bolts should be worked into the concrete so that the template top is about .75 inch (20 mm) above the concrete surface. The centerline of the triangle formed by the bolts should lie approximately parallel to the runway center line and the centers of the templates should be in a straight line within ± 1 inch (25 mm) and perpendicular to the runway.

IMPORTANT: Take care when working the bolts into the concrete that there are no voids around them which could subsequently lead to looseness of the bolts.

- e) With a level (or theodolite) and a surveyor's staff placed on each template in turn, measure and record these levels with respect to datum.

3.1.3.2 Preparation of Mounting Legs

While waiting for the concrete to harden, the mounting legs can be prepared. The site installation drawing will have established the optical centerline height of the wingbar and also the local ground levels at each of the PAPI units, all referred to datum.

- a) Knowing the nominal dimensions of the units and the actual levels of the base templates as determined in 3.1.3.1 above, it is possible to determine the lengths of the individual mounting legs. In practice, the overall accuracy need not be better than .25 inch (5 mm).
- b) Having determined the length, these can be marked on lengths of 2" EMT (contractor provided - except on export orders). Cut the EMT and clearly identify each piece (e.g. with numbers 1 to 4 corresponding to the units starting from the one nearest the runway).
- c) Assemble the mounting legs using the hardware provided. Refer to Figures 3-11 and 3-12 for details.

3.1.4 Installation of PAPI Light Units

- a) When the concrete is sufficiently set, the templates and twelve nuts remaining on the foundation bolts can be removed.
- b) Mount each leg on its respective pad, checking to ensure that the floor flanges seat flat and level on the foundation before tightening the hold-down nuts.
- c) Mount the unit on the legs and tighten all EMT locknuts.

3.1.4.1 Height Adjustment

Loosen the locknuts on the under side of the base and adjust the height of all units in the wingbar until the base frames are at the same level to within 1/4 inch (7 mm). This is achieved by running the nuts of the three legs up or down by equal amounts, while sighting with a level on to a surveyor's staff. The optical centerline height (OCL) of all four units should correspond with that shown on the site drawing.

3.1.4.2 Cross-Leveling

Set the clinometer vernier to 0° , 0 minutes. Place the clinometer in position inside the housing (reference Figure 4-5) and adjust the side nuts deferentially until the clinometer bubble indicates the unit is level from side to side. Tighten the locknuts on the under side of the two side legs. Correction of gross errors in this step requires repeating, Section 3.1.5.1. See notes of Figure 3-12.

3.1.4.3 Elevation Setting

Set the clinometer vernier to the correct elevation angle for the particular light unit. Place the clinometer in position inside the housing (ref. Figure 4-5), and adjust the pair of nuts on the support stud at the rear of the light unit until the bubble is centered in the level. Avoid straining support tabs, i.e. just take up the slack with the top nuts, adjust them deferentially to bring the unit to the correct elevation angle and then tighten the locknuts on the under wise of the lugs. (It is well to recheck the cross-leveling at this point; re-adjust if necessary before finally adjusting the elevation). Tighten the adjusting nuts and locknuts securely, making sure the critical elevation setting is not affected. For an independent method of verifying the angles, see Appendix A.

3.1.4.4 Tilt Switch Adjustment

When all light unit alignment is finished, adjust the tilt switches as follows:

- a) Set clinometer vernier to 0° , 0 minutes.
- b) Carefully set the Clinometer on the mechanism.
- c) Raise or lower the mechanism until the Clinometer bubble is centered in the level.
- d) Tighten the tilt switch mechanism nuts, taking care to maintain the level at zero.
- e) Repeat this procedure for the remaining boxes.

NOTE: Using an ohmmeter to adjust the tilt switch mechanism is not recommended, as it does not provide adequate alignment. Check that all lamps and filters are properly installed. Reference Figure 4-6.

3.1.5 Electrical Connections

3.1.5.1 Below Grade

Refer to Figures 3-2 through 3-7 for connections.

3.1.5.2 Above Grade

Refer to Figures 4-4 and 4-5 for mounting of the 27102 power entry kit. Make electrical connections per Figures 2-1 through 2-4. Connect a good earth ground to each light unit, using the terminal at the top of the input power cable. See Figure 4-4. **CAUTION: DO NOT connect this terminal to the counterpoise system.** * This caution statement is not applicable to option -21 units for Canada.

3.1.6 Installation and Operation of PCU



WARNING

WARNING:

Installation, service, maintenance or operation should be performed by qualified personnel only.

3.1.6.1 Installation

The Power and Control Unit is supplied ready for operation with all ordered options installed. Electrical adjustment of the tap on transformer T1 may be necessary (See 3.1.6.5.2, Step 7).

3.1.6.2 Location

The PCU may be installed in all locations meeting the environment specified in Section 1.2.3.3. The equipment should be accessible to qualified personnel only. In addition, adequate drainage should be provided to preclude the possibility of standing water hindering maintenance operations. See Fig. 3-1.

3.1.6.3 Installation Drawings

Typical installation details are provided in Figures 3-9 through 3-11. Additional information can be found in Chapter II of FAA Advisory Circular AC 150/5345-28E.

3.1.6.4 Power Requirements

The Table below lists the input voltage and current requirements for the different PCU Dash Numbers. It is recommended that the distribution circuit breaker be sized to carry at least 125% of the rated current.

POWER REQUIREMENTS

TOTAL NUMBER OF LAMPS PER SYSTEM	SUPPLY VOLTAGE	NOMINAL LINE CURRENT
6	208V - 240V	5.8A - 5.0A
12	208V - 240V	11.5A - 10.0A

3.1.6.4.1 Cables and Conduit

It is suggested that input power and load cables be located and routed away from sensitive control, radar, or communications lines.

3.1.6.5 Installation Check List

- NOTICE:(1) Read and become familiar with this procedure before attempting installation of this equipment. Improper installation can damage this equipment and void the warranty! If the equipment fails to perform properly at any step of this procedure, consult the problem solving guide. Call Crouse-Hinds at (860) 683-4300 if further information is required during installation.
- (2) Further, the Addenda Instructions for each equipment option included should similarly be understood before proceeding with installation.
- (3) Installer should initial in space provided () after completing each step.

3.1.6.5.1 Mechanical Installation

- () 1. Unpack the PCU, open the enclosure and check for any shipping damage.
- () 2. Refer to paragraphs 3.1.3.1 through 3.1.4 and Figure 3-9 for cement pad and leg information. See Figure 3-11 for mounting details, and Figure 3-10 for conduit hole locations.
- () 3. Proceed to mount the enclosure to the legs.
- () 4. Install the photocell unit using the hardware provided. The sealing ring must be properly installed to maintain NEMA 4 integrity.
- () 5. Remove all dirt and foreign material from the enclosure.

3.1.6.5.2 Electrical Wiring and Operational Checkout

- () 1. Connect the equipment ground to the grounding terminal located in the lower edge of the base plate. **CAUTION: DO NOT CONNECT COUNTERPOISE SYSTEM TO THIS TERMINAL.** * This caution statement is not applicable to option -21 units for Canada.
- () 2. Verify the voltage source corresponds to the PCU nameplate ratings.
- () 3. Connect the primary voltage source to input terminal block TB1. See Figure 2-5.

3.1.6.5.2 Electrical Wiring and Operational Checkout (Cont'd)

- () 4. Connect the PAPI Light Units to the terminals of T1. See Figure 2-5. **CAUTION: DO NOT** megger test with the wires connected to the PCU.
- () 5. Connect a short jumper wire from Remote A to Remote B on TB1. Also connect a short jumper wire from Tilt Sw A to Tilt Sw B on TB1.
- () 6. Apply source power to the unit. Close circuit breaker CB1 and verify that the PAPI lights are on. Under daytime conditions, the lights will turn on to the low step and switch to high after 45-75 seconds.
- () 7. Connect a voltmeter across the load terminals on T1. If the voltage is above 30 VAC when in the high step, turn off the PCU and move wire #26 to the next higher voltage tap/on T1. Likewise, if the voltage is below 29 VAC, turn off the PCU and move wire #26 to the next lower voltage tap on T1.
- () 8. Turn off source power to the PCU. Connect tilt switch and remote control lines, if required, to terminal block TB1 per appropriate wiring diagram. Refer to Figure 2-5. (Remember to remove jumper wires when connecting tilt switch and remote leads. If remote terminals are not to be used, leave jumper in place).



CAUTION:

The PCU uses 12VDC, provided by the unit, for remote control and tilt switch circuits. Incorrect wiring can cause malfunction or damage to the control system. Re-check these connections before attempting operation.

- () 9. The PCU is factory set for the lower (5%) night-time intensity level. If required, the night-time intensity can be adjusted to 20% by moving wire #20 from T1-H1 to T1-H2. This change will not affect daytime operation.
- () 10. Make a final operational check.
- () 11. Check that all cables and wiring are fully retracted within the cabinet. Close the cabinet door and secure all fasteners.

3.2 OPERATION

Following installation and initial checkout, no electrical adjustments are required for normal operation.

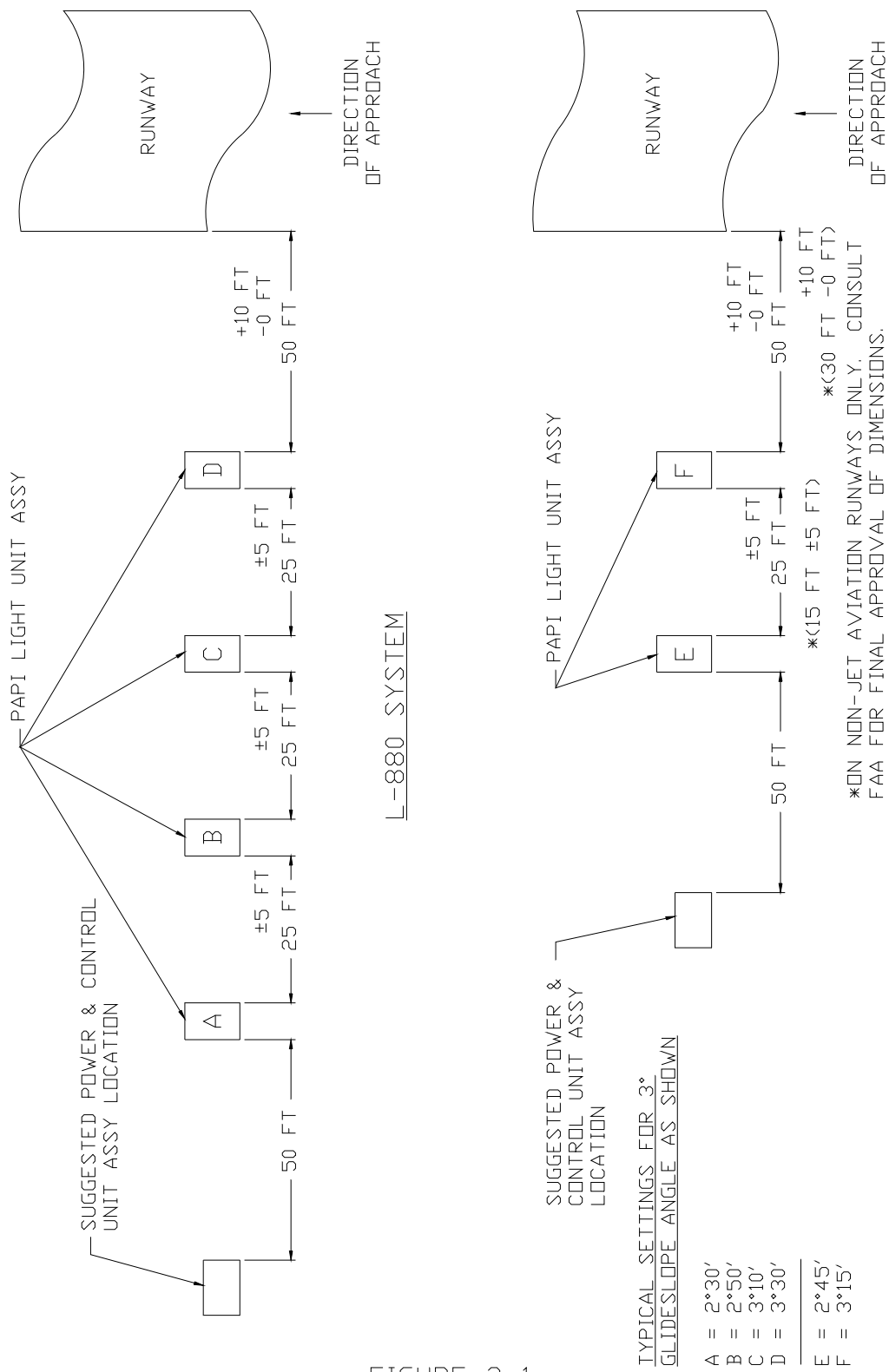


FIGURE 3-1

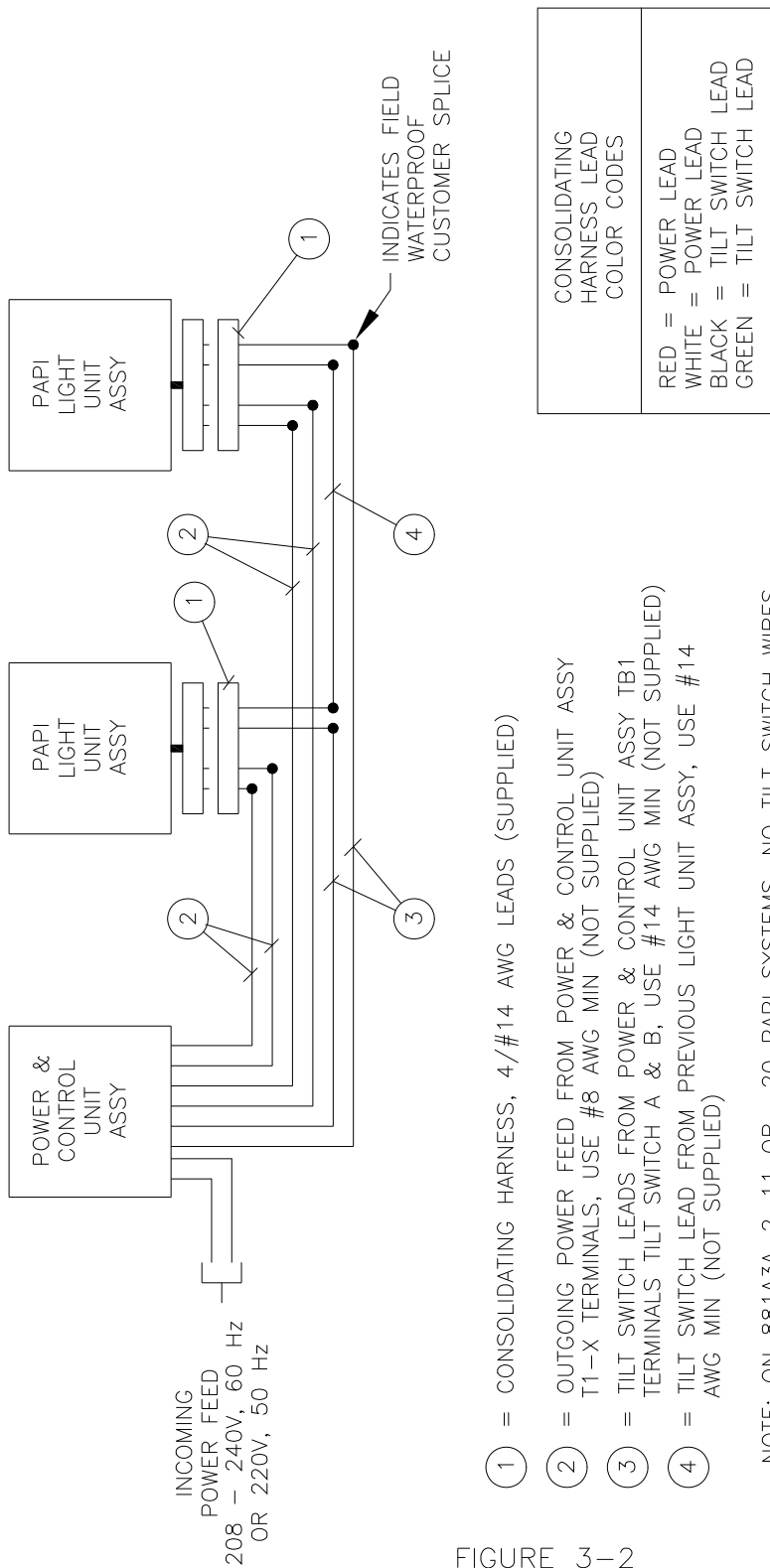


FIGURE 3-2

- ① = CONSOLIDATING HARNESS, 4/#14 AWG LEADS (SUPPLIED)
- ② = OUTGOING POWER FEED FROM POWER & CONTROL UNIT ASSY T1-X TERMINALS, USE #8 AWG MIN (NOT SUPPLIED)
- ③ = TILT SWITCH LEADS FROM POWER & CONTROL UNIT ASSY TB1 TERMINALS TILT SWITCH A & B, USE #14 AWG MIN (NOT SUPPLIED)
- ④ = TILT SWITCH LEAD FROM PREVIOUS LIGHT UNIT ASSY, USE #14 AWG MIN (NOT SUPPLIED)

NOTE: ON 881A3A-2-11 OR -20 PAPI SYSTEMS, NO TILT SWITCH WIRES (④ & ⑤) ARE REQUIRED. A JUMPER WIRE (#16 AWG MIN) MUST BE ADDED BETWEEN POWER & CONTROL UNIT ASSY TB1 TERMINALS TILT SWITCH A & B FOR UNIT TO FUNCTION.

L-881 STYLE "A" SYSTEM
PART NO's 881A3A-X, & 881A3A-2-11 OR -20
PAPI FIELD WIRING CONNECTIONS

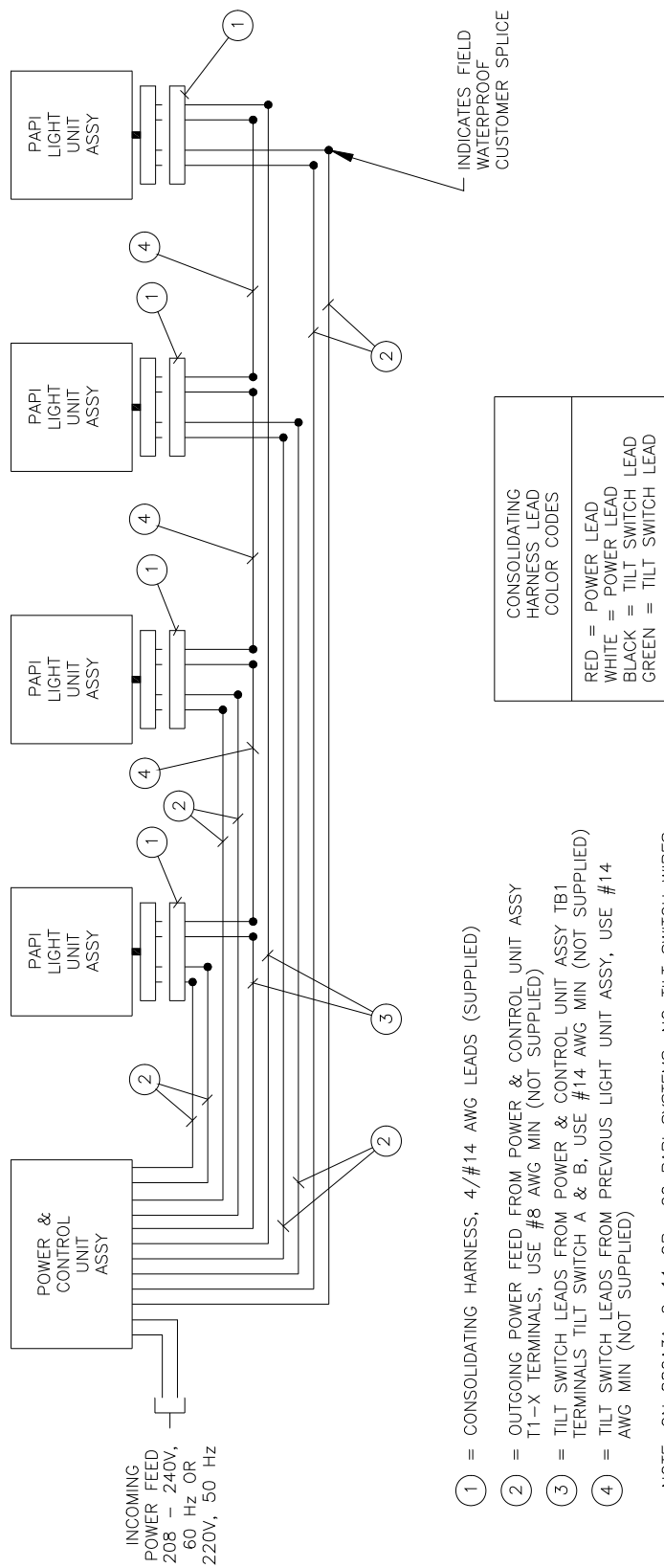


FIGURE 3-3

L-880 STYLE "A" SYSTEM
PART NO's 880A3A-X & 880A3A-2-11 OR -20
PAPI FIELD WIRING CONNECTIONS

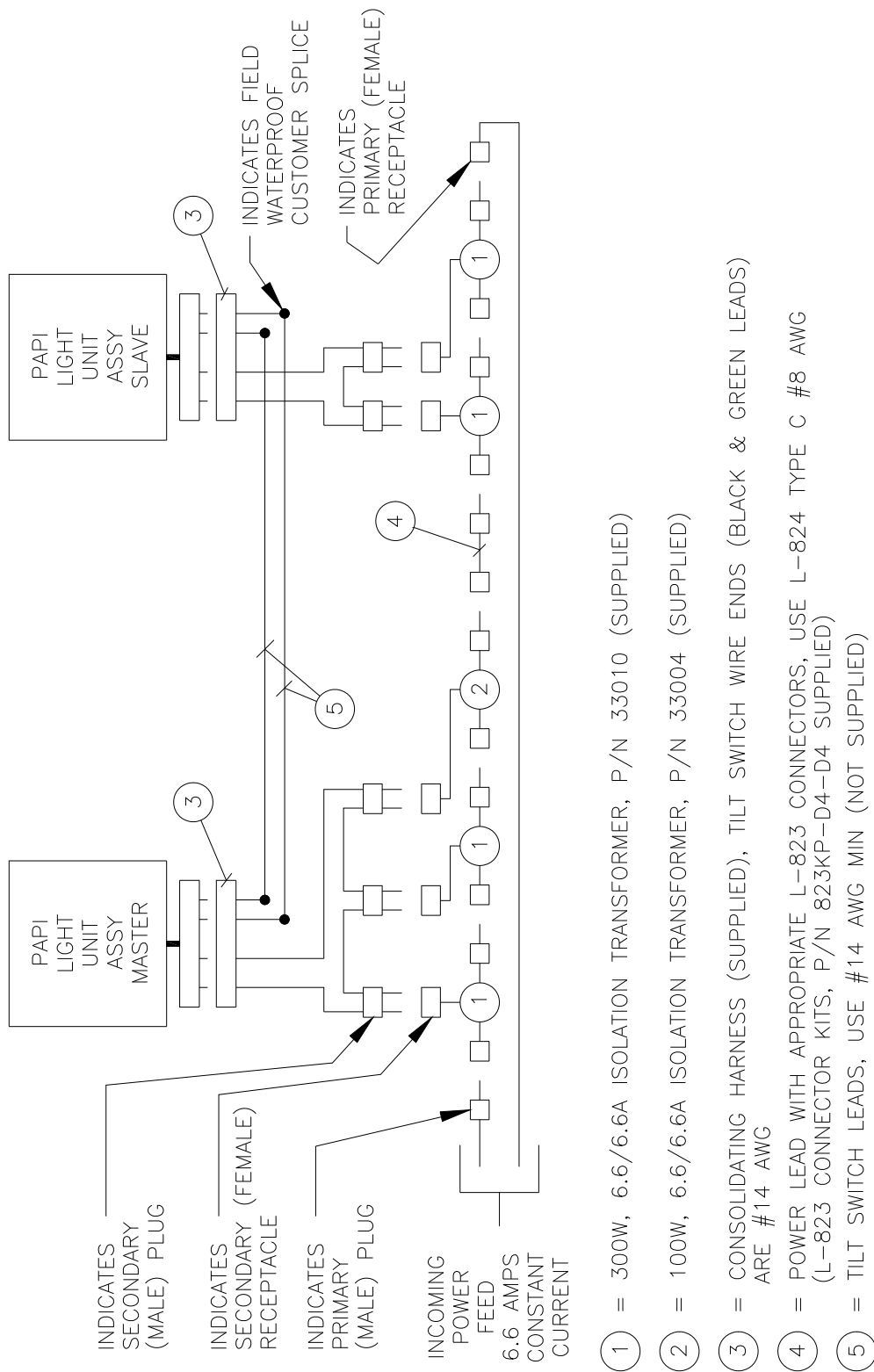
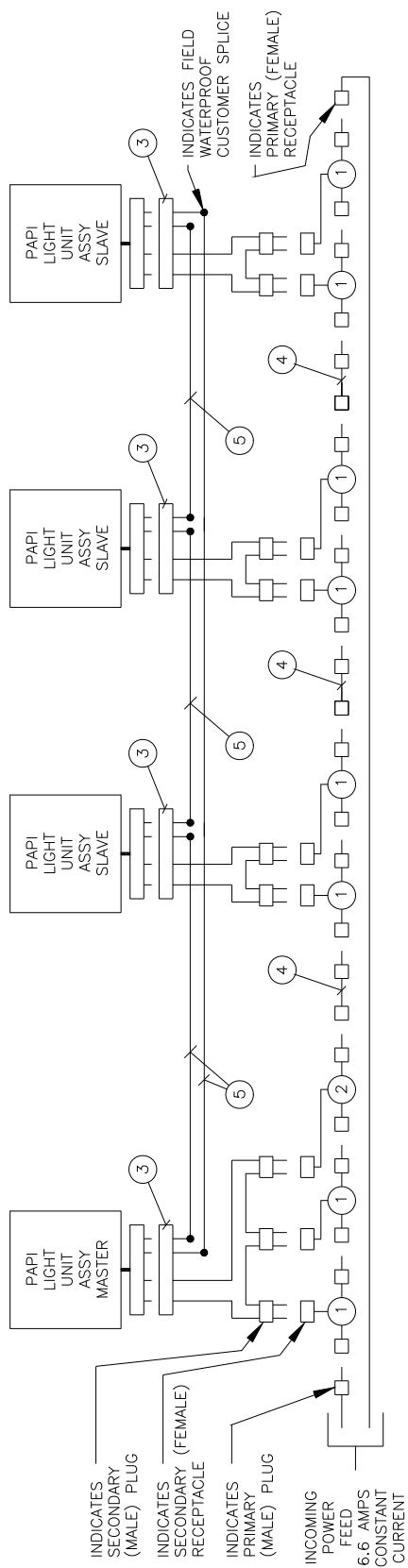


FIGURE 3-4

L-881 STYLE "B" SYSTEM (WITH TILT SWITCHES)

PART NO's 881A3B-1 & 881A3B-2
PAPI FIELD WIRING CONNECTIONS



- ① = 300W, 6.6/6.6A ISOLATION TRANSFORMER, P/N 33010 (SUPPLIED)
- ② = 100W, 6.6/6.6A ISOLATION TRANSFORMER, P/N 33004 (SUPPLIED)
- ③ = CONSOLIDATING HARNESS (SUPPLIED), TILT SWITCH WIRE ENDS (BLACK & GREEN LEADS) ARE #14 AWG
- ④ = POWER LEADS WITH APPROPRIATE L-823 CONNECTORS, USE L-824 TYPE C #8 AWG (L-823 CONNECTOR KITS, P/N 823KP-D4-D4 SUPPLIED)
- ⑤ = TILT SWITCH LEADS, USE #14 AWG MIN (NOT SUPPLIED)

FIGURE 3-5

L-880 STYLE "B" SYSTEM (WITH TILT SWITCHES)
 PART NO's 880A3B-1 & 880A3B-2
 PAPI FIELD WIRING CONNECTIONS

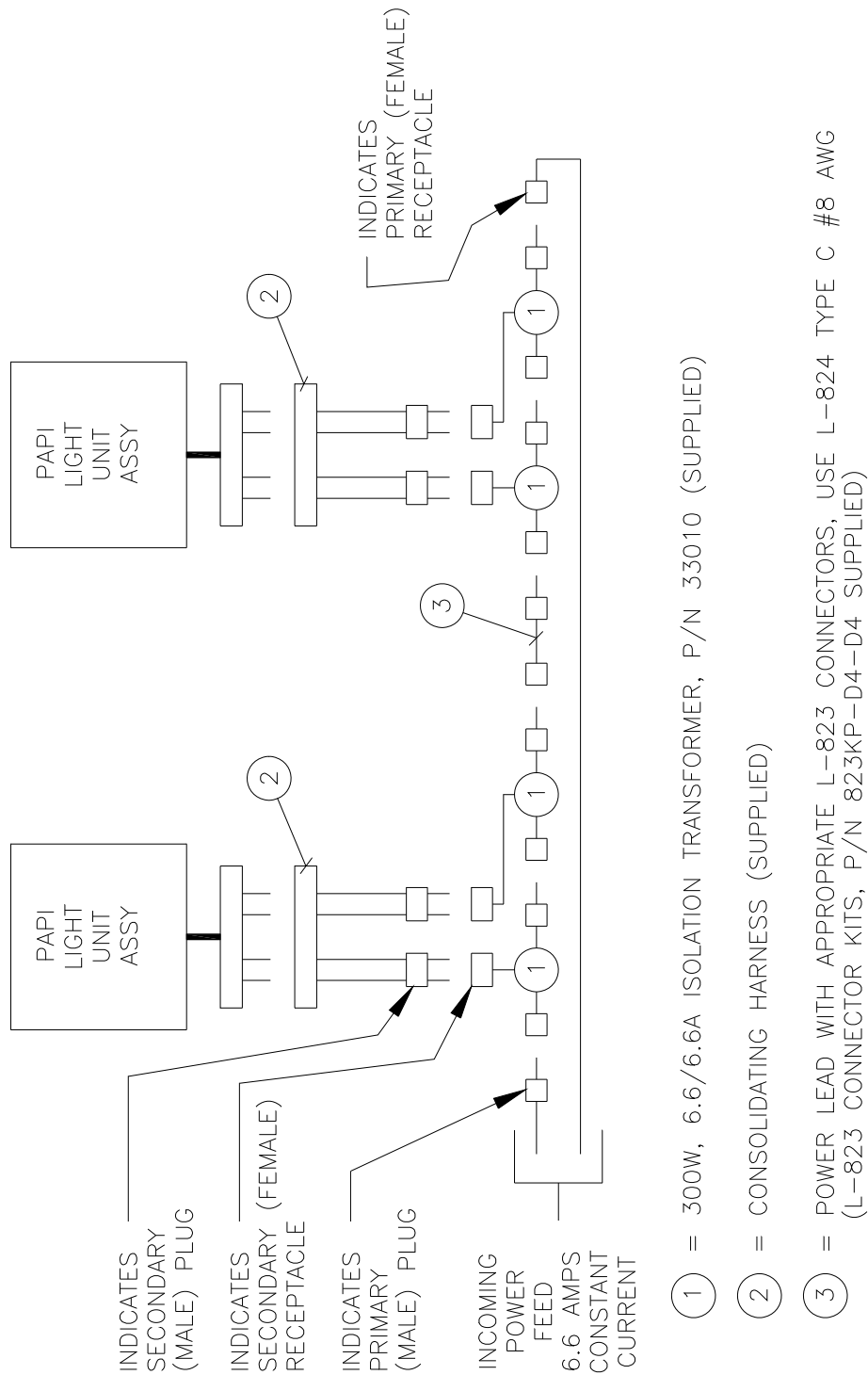


FIGURE 3-6

L-881 STYLE "B" SYSTEM (WITHOUT TILT SWITCHES)
PART NO 881A3B-2-11 OR -20
PAPI FIELD WIRING CONNECTIONS

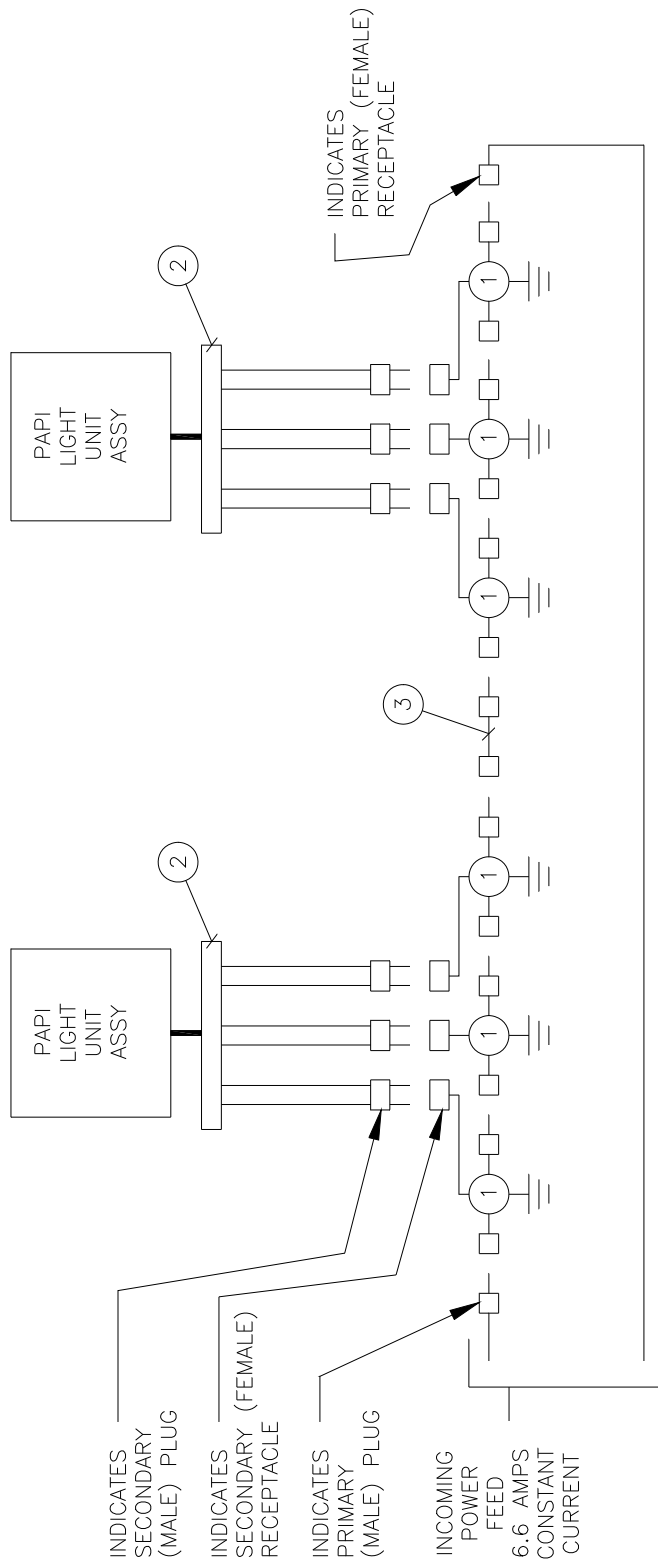
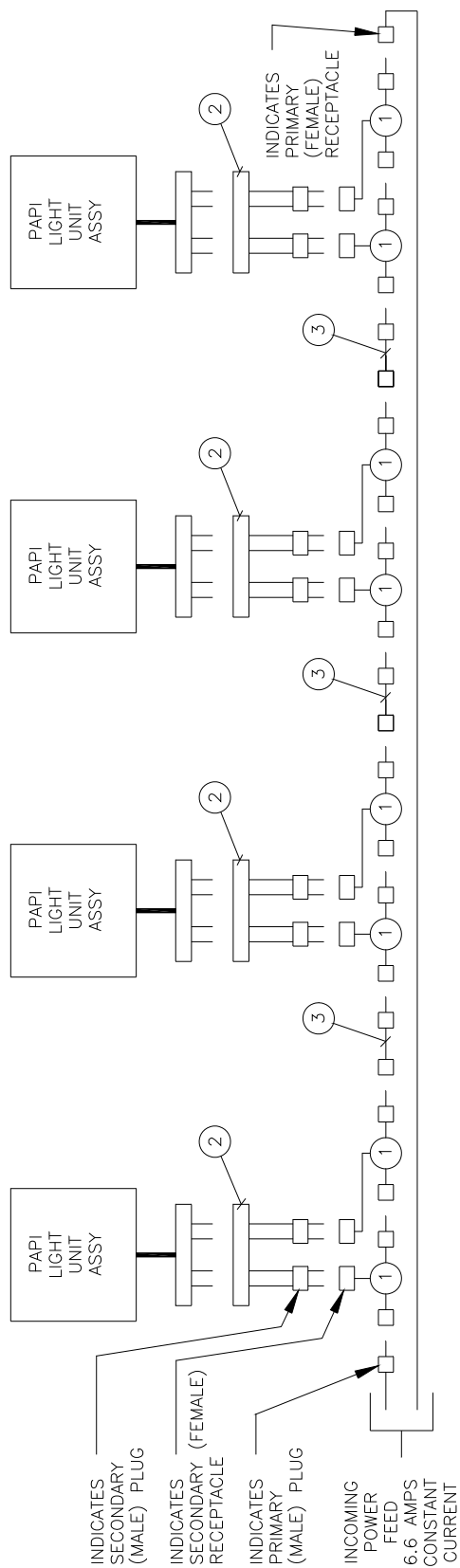


FIGURE 3-6A

- ① = 200W, 6.6/6.6A ISOLATION TRANSFORMER, CSA APPROVED, GROUNDED SECONDARIES (BY OTHERS)
- ② = POWER ENTRY KIT, P/N 27135
- ③ = POWER LEAD WITH APPROPRIATE L-823 CONNECTORS, USE L-824 TYPE C #8 AWG (L-823 CONNECTOR KITS, P/N 823KP-D4-D4 SUPPLIED)

L-881 STYLE "B" SYSTEM WITH GROUNDED TRANSFORMERS
BUT WITHOUT TILT SWITCHES

PART NO 881A3B-2-21
PAPI FIELD WIRING CONNECTIONS



① = 300W, 6.6/6.6A ISOLATION TRANSFORMER, P/N 33010 (SUPPLIED)

② = CONSOLIDATING HARNESS (SUPPLIED)

③ = POWER LEADS WITH APPROPRIATE L-823 CONNECTORS, USE L-824 TYPE C #8 AWG (L-823 CONNECTOR KITS, P/N 823KP-D4-D4 SUPPLIED)

FIGURE 3-7

L-880 STYLE "B" SYSTEM (WITHOUT TILT SWITCHES)
PART NO 880A3B-2-11 OR -20
PAPI FIELD WIRING CONNECTIONS

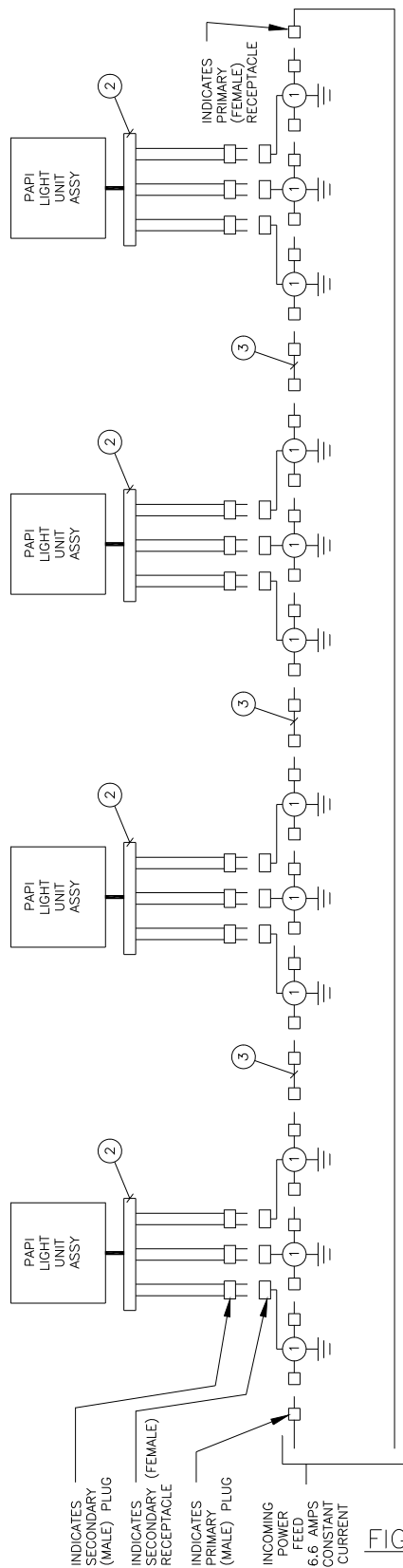
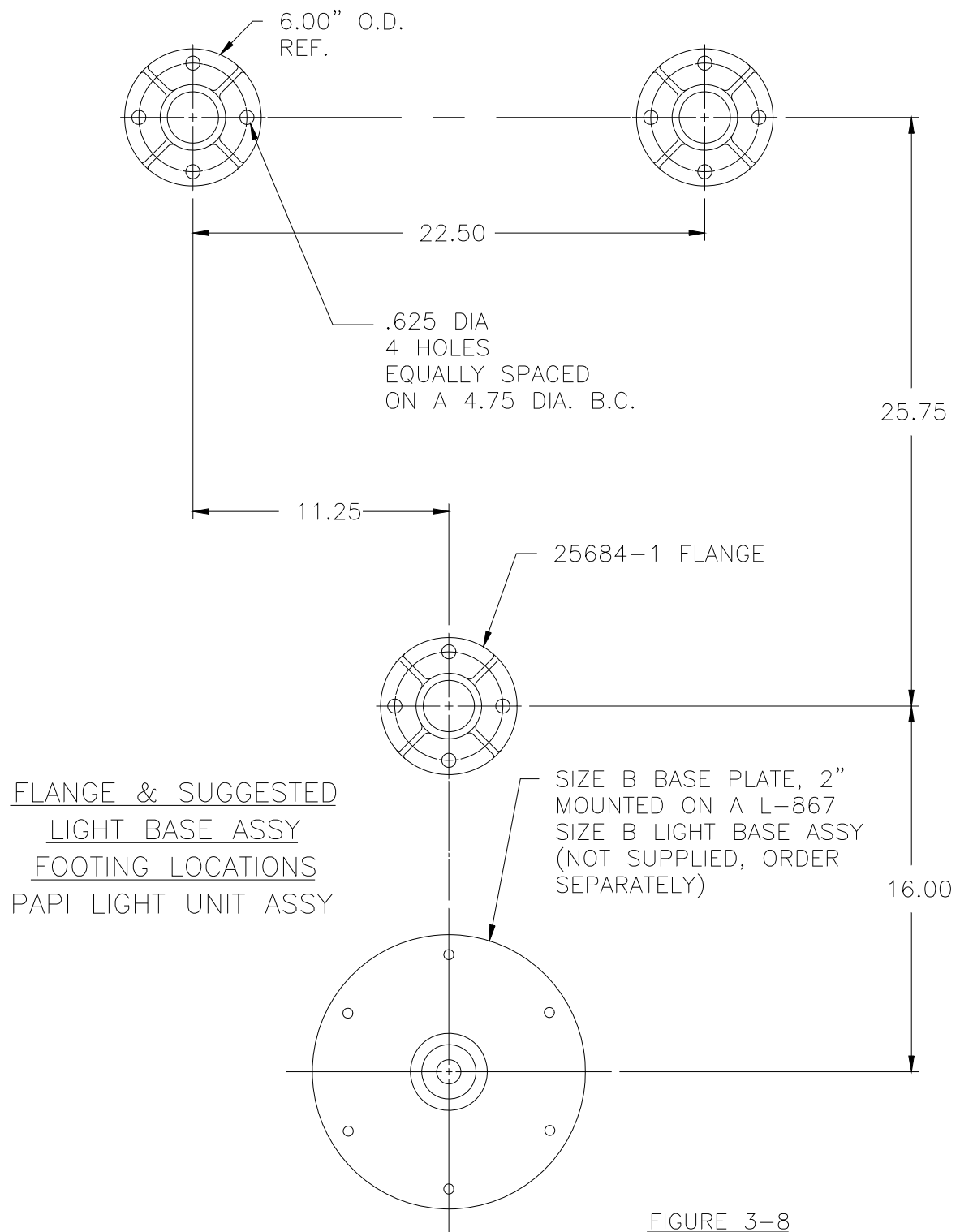


FIGURE 3-7A

- ① = 200W, 6.6/6.6A ISOLATION TRANSFORMER, CSA APPROVED, GROUNDED SECONDARIES (BY OTHERS)
- ② = POWER ENTRY KIT, P/N 27135
- ③ = POWER LEADS WITH APPROPRIATE L-823 CONNECTORS, USE L-824 TYPE C #8 AWG (L-823 CONNECTOR KITS, P/N 823KP-D4-D4 SUPPLIED)

L-880 STYLE "B" SYSTEM WITH GROUNDED ISOLATION TRANSFORMERS
 BUT WITHOUT TILT SWITCHES AND LAMP BYPASS
 PART NO 880A3B-2-21
 PAPI FIELD WIRING CONNECTIONS



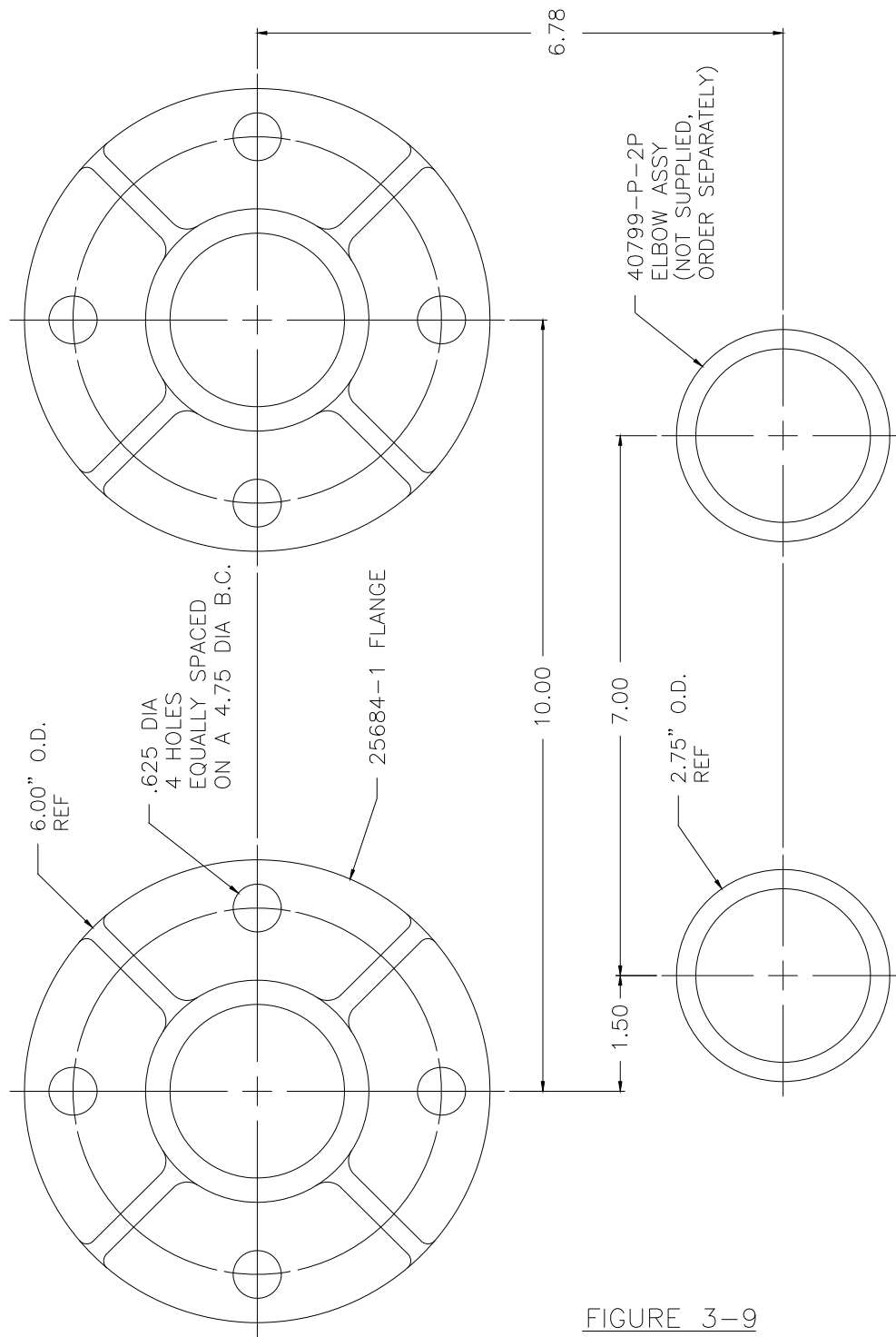


FIGURE 3-9

SUGGESTED FLANGE & ELBOW ASSY FOOTING LOCATIONS
POWER & CONTROL UNIT ASSY
FOR 27185-3 ONLY

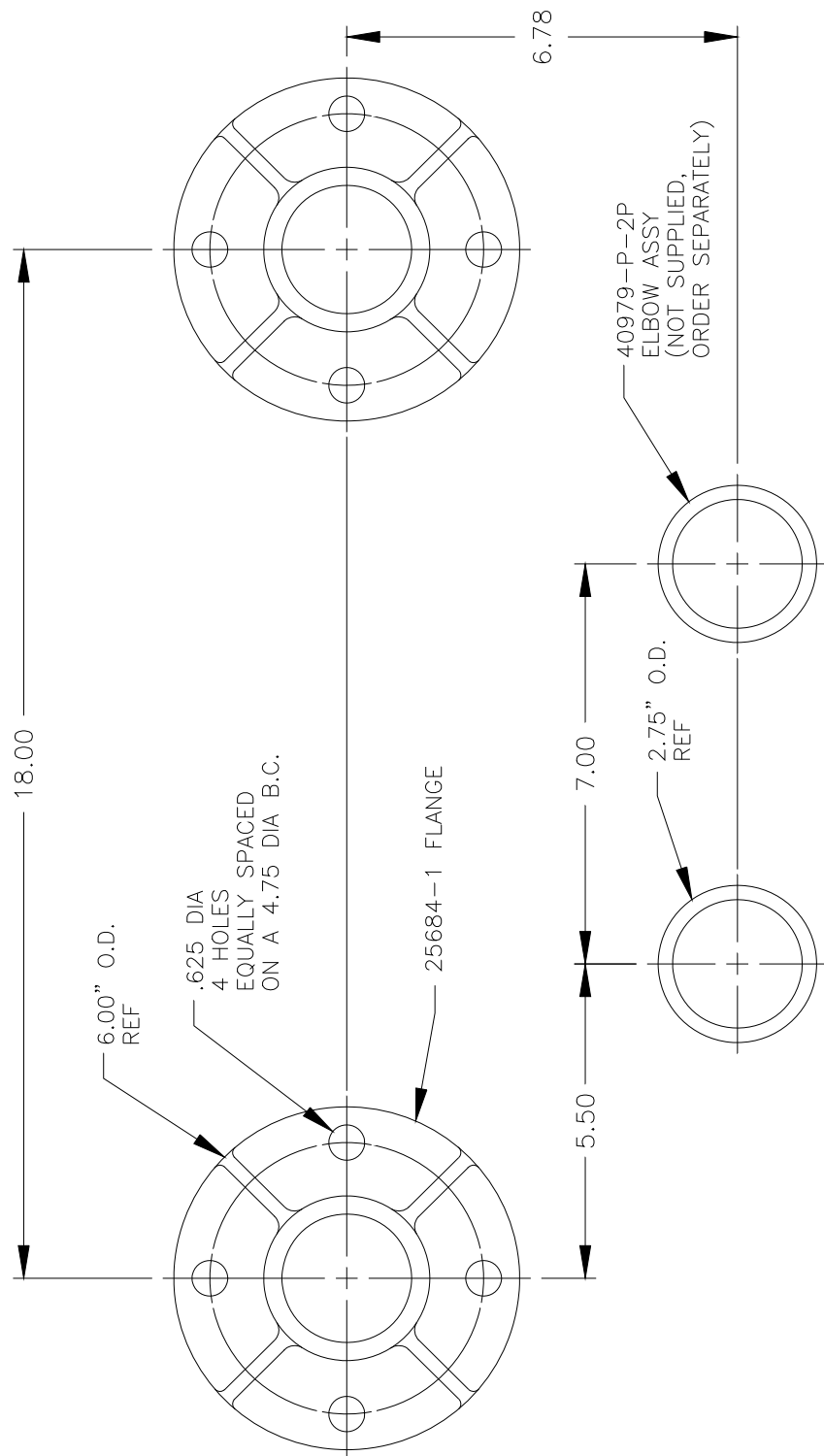


FIGURE 3-9A

SUGGESTED FLANGE & ELBOW ASSY FOOTING LOCATIONS
POWER & CONTROL UNIT ASSY
FOR 27185-4 ONLY

TO AVOID DAMAGING EQUIPMENT, REMOVE BASEPLATE ASSEMBLY FROM CABINET BEFORE DRILLING HOLES FOR EMT CONNECTORS. RE-INSTALL BASEPLATE ASSEMBLY TO CABINET AFTER THIS OPERATION IS COMPLETED.

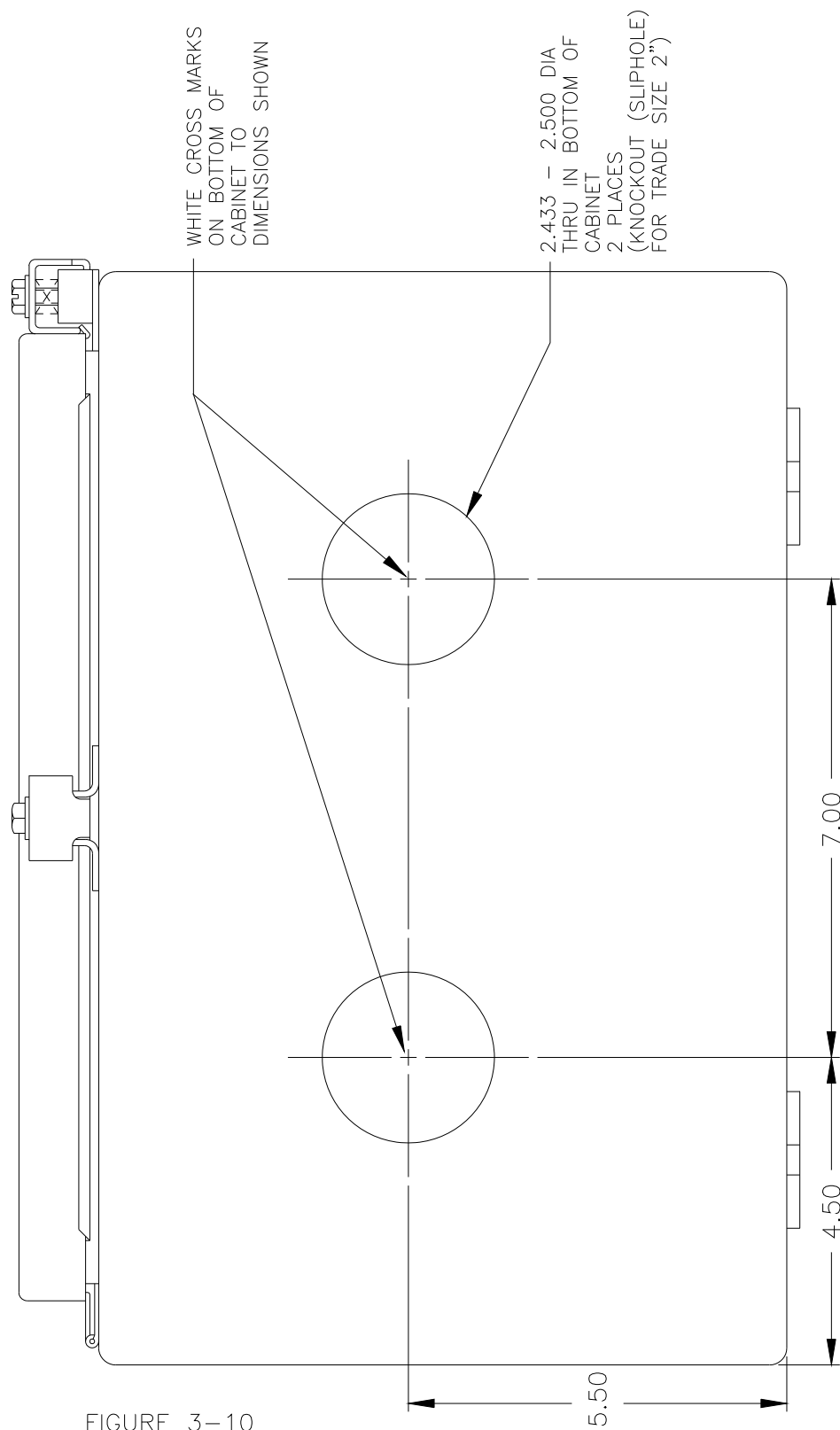


FIGURE 3-10

SUGGESTED POWER & CONTROL WIRING ENTRY & EXIT LOCATIONS
POWER & CONTROL UNIT ASSY
FOR 27185-3 ONLY

TO AVOID DAMAGING EQUIPMENT, REMOVE BASEPLATE ASSEMBLY FROM CABINET BEFORE DRILLING HOLES FOR EMT CONNECTORS. RE-INSTALL BASEPLATE ASSEMBLY TO CABINET AFTER THIS OPERATION IS COMPLETED.

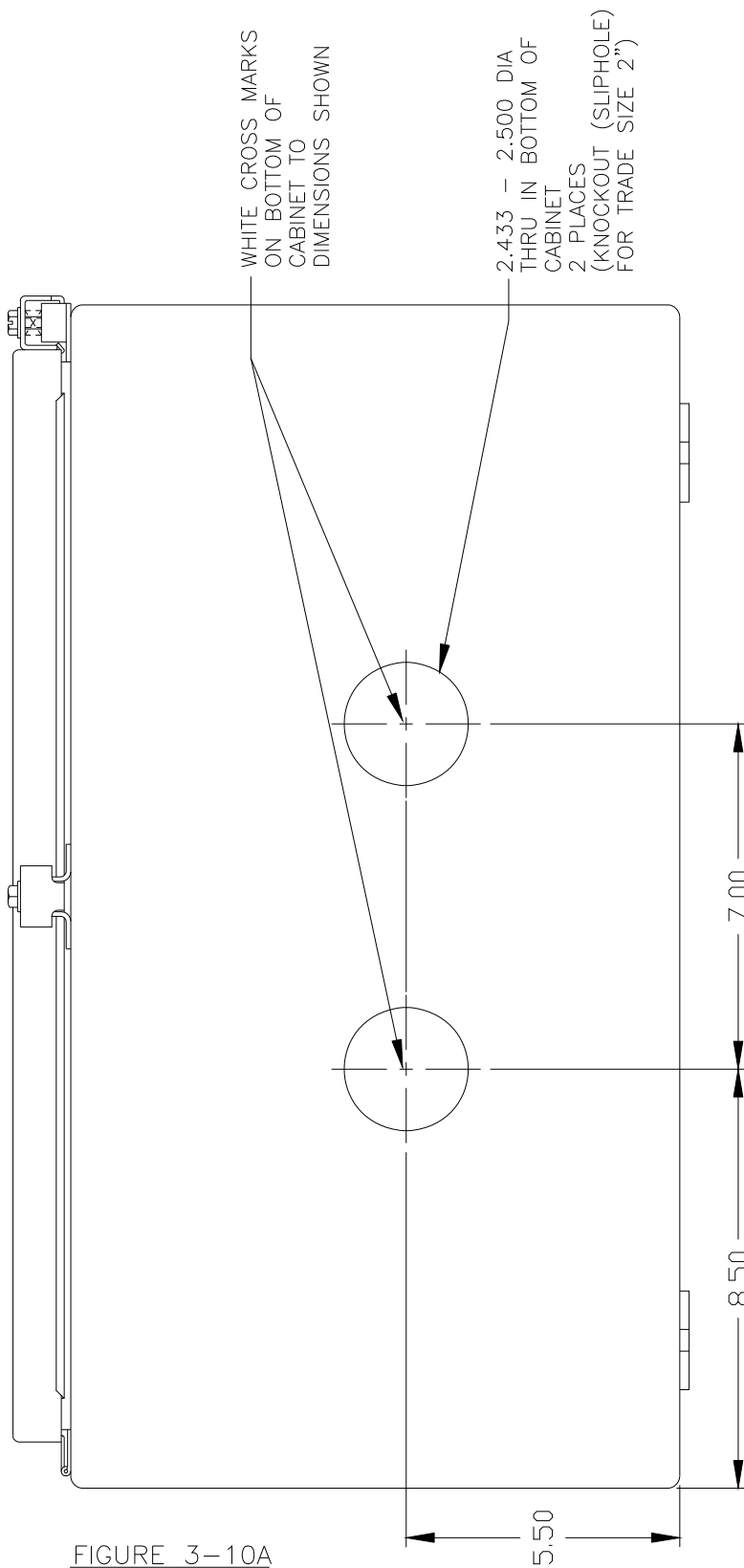
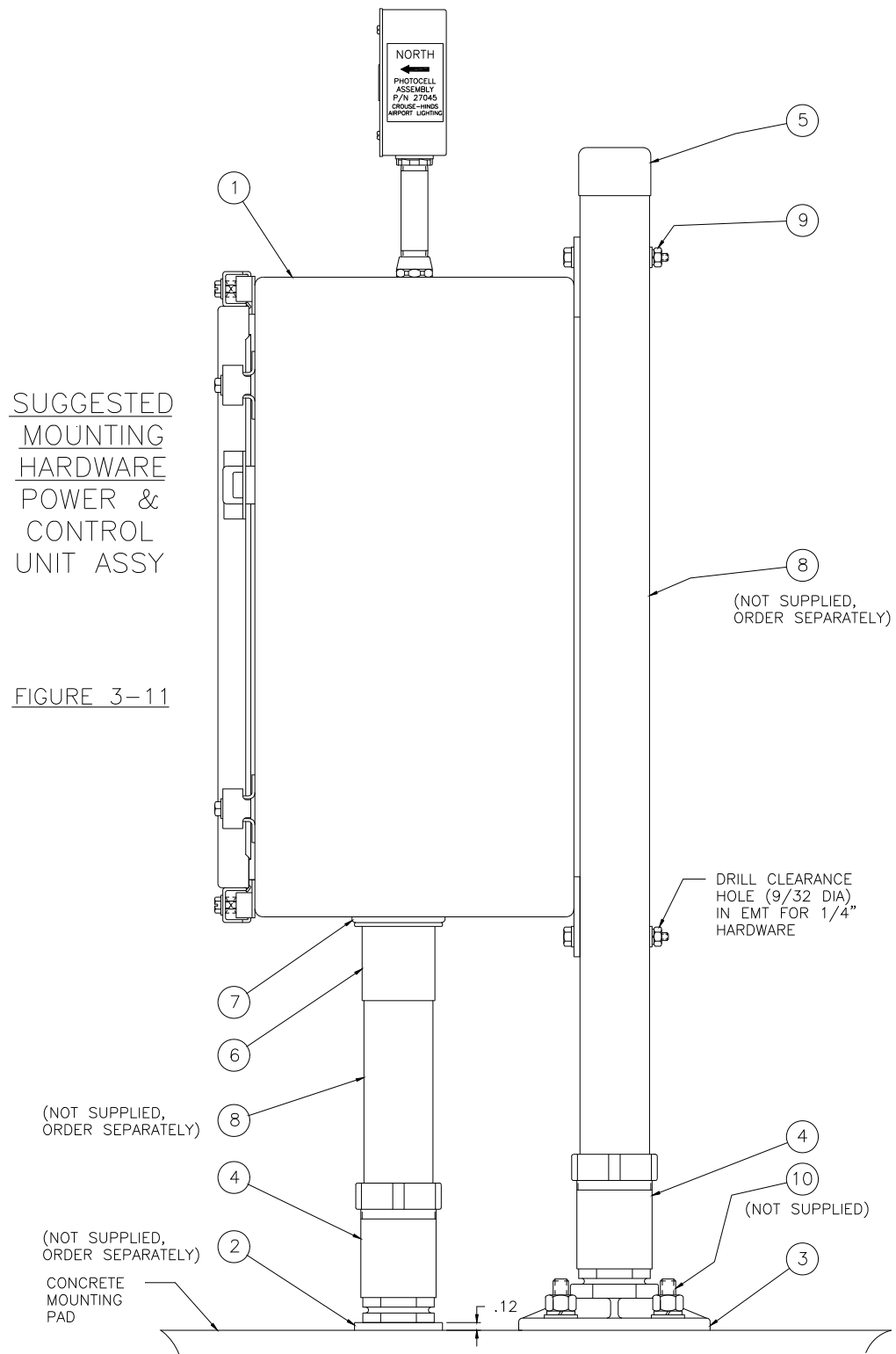


FIGURE 3-10A

SUGGESTED POWER & CONTROL WIRING ENTRY & EXIT LOCATIONS
POWER & CONTROL UNIT ASSY
FOR 27185-4 ONLY



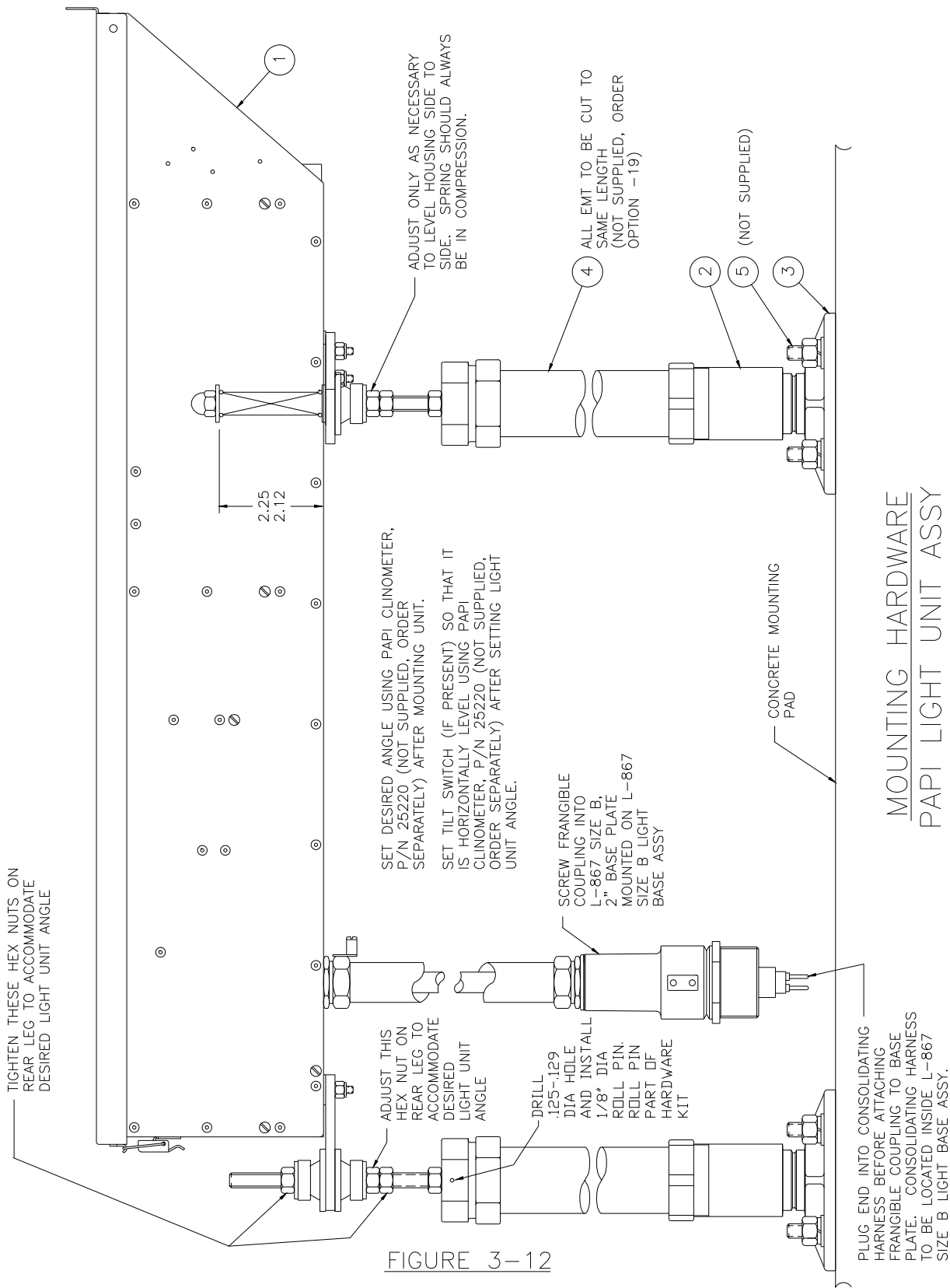


FIGURE 3-12

PARTS LIST: SUGGESTED MOUNTING HARDWARE
POWER & CONTROL UNIT ASSY

NOTICE: ITEMS 3 THRU 7 & ITEM 9 ARE SUPPLIED WITH THE "PCU" AS PART OF THE 27096 HARDWARE KIT. ORDER OTHER ITEMS SEPARATELY TO INSTALL THE "PCU" AS SHOWN IN THIS MANUAL

ITEM NUMBER	QUANTITY REQUIRED	DESCRIPTION	CROUSE-HINDS PART NO.
1	-	POWER & CONTROL UNIT ASSY	27185-X
2	2	2" 90° ELBOW ASSY (PLASTIC)	40799-P-2P
3	2	FLANGE	25684-1
4	4	FRANGIBLE COUPLING, 2" W/ COMPRESSION FITTING	61062-1
5	2	PIPE CAP	10037-459
6	2	CONNECTOR, INSULATED W/ SET SCREW, 2" CONDUIT	10037-529
7	2	SEALING RING, 2"	10037-535
8	* 3	EMT, 2", 40" LG	***25218
9	4	BOLT, HEX HD, 1/4-20 x 3.00" LG., STN STL	10C01-025D64
	8	FLAT WASHER, 1/4, STN STL	11A02-025D
	4	LOCK WASHER, SPLIT, 1/4, STN STL	11A12-025D
10	4	HEX NUT, 1/4-20, STN STL	10K01-025D
	8	ANCHOR ROD, 1/2-13 x LENGTH DESIRED, STN STL	**
	8	FLAT WASHER, 1/2, STN STL	**
	8	LOCK WASHER, SPLIT, 1/2, STN STL	**
	8	HEX NUT, 1/2-13, STN STL	**

TABLE 3-1

*LENGTH/ QUANTITY TO BE DETERMINED BY HEIGHT DESIRED
 ** THIS HARDWARE NOT SUPPLIED BY CROUSE-HINDS AIRPORT LIGHTING PRODUCTS
 *** INCLUDED WITH OPTION -11 STYLE "A" SYSTEMS

PARTS LIST: MOUNTING HARDWARE

PAPI LIGHT UNIT ASSY

NOTES:

1) ONLY ITEMS 2, 3, 6 THRU 12 ARE SUPPLIED WITH THE PAPI LIGHT UNIT ASSY. ITEMS 2, 3, 6-10, & 12 ARE PART OF 27184 HARDWARE KIT.

2) ORDER OTHER ITEMS SEPARATELY TO INSTALL THE PAPI LIGHT UNIT ASSY AS SHOWN IN THIS MANUAL.

ITEM NUMBER	QUANTITY									DESCRIPTION	CROUSE-HINDS PART NO.
	-1	-2	-3	-4	-5	-6	-7	-8	-9		
1	-	-	-	-	-	-	-	-	-	PAPI LIGHT UNIT ASSY	27175-X
2	3	3	3	3	3	3	3	3	3	COUPLING, FRANGIBLE	61062-1
3	3	3	3	3	3	3	3	3	3	FLANGE	25684-1
4	*	*	*	*	*	*	*	*	*	EMT, 2"	***OPTION -19
5	12	12	12	12	12	12	12	12	12	ANCHOR ROD, 1/2-13 x LENGTH DESIRED, STN STL	**
	12	12	12	12	12	12	12	12	12	FLAT WASHER, 1/2, STN STL	**
	12	12	12	12	12	12	12	12	12	LOCK WASHER, SPLIT, 1/2, STN STL	**
	12	12	12	12	12	12	12	12	12	HEX NUT, 1/2-13, STN STL	**
6										NOT USED	
7										NOT USED	
8										NOT USED	
9										NOT USED	
10										NOT USED	
11	1	1	-	-	-	-	-	-	-	CONSOLIDATING HARNESS	27195
	-	-	-	-	1	1	-	-	-	CONSOLIDATING HARNESS	27068-1
	-	-	-	-	-	-	-	-	1	CONSOLIDATING HARNESS	27068-2
	-	-	1	1	-	-	-	-	-	CONSOLIDATING HARNESS	27068-3
12	1	1	1	1	1	1	1	1	CABLE CLAMP ASSY	25003	
	1	1	1	1	1	1	1	1	L-867 SIZE B LIGHT BASE	900062-B-24-F2	
	1	1	1	1	1	1	1	1	1	BASE PLATE, 2" WITH GASKET	1932

*LENGTH/ QUANTITY TO BE DETERMINED BY HEIGHT DESIRED
 **THIS HARDWARE NOT SUPPLIED BY CROUSE-HINDS AIRPORT LIGHTING PRODUCTS
 ***INCLUDED WITH OPTIONS -11 AND -21

TABLE 3-2

WIRING CONNECTIONS POWER & CONTROL UNIT ASSY				
NOTICE: CUSTOMER MUST INSTALL "PC1" WIRES TO DESTINATIONS SHOWN				
WIRE NUMBER	ORIGIN		DESTINATION	
	REF DES	TERMINATION	REF DES	TERMINATION
1	TB1	LINE A	CB1	LINE A
2	TB1	LINE B	CB1	LINE B
3	TB1	REMOTE A (BOT.)	P.C. BD.	TB2-5
4	TB1	REMOTE B (TOP)	P.C. BD.	TB2-10
5	TB1	TILT SW A (BOT.)	TB1	REMOTE A
6	TB1	TILT SW B (TOP)	P.C. BD.	TB2-11
7	P.C. BD.	TB2-2	CB1	LOAD B
8	NOT USED			
9	NOT USED			
10	P.C. BD.	TB2-1	CB1	LOAD A
11	CB1	LOAD B	K1	#4
12	P.C. BD.	TB2-12	K1	COIL #1
13	P.C. BD.	TB2-13	K2	COIL #2
14	P.C. BD.	TB2-14	K1	COIL #2
15	CB1	LOAD A	K1	#3
16	K1	COIL #1	K2	COIL #1
17	K1	#5	K2	#3
18	K1	#6	K2	#4
19	K2	#6	T1	H3
20	K2	#8	T1	H1
21	T1	GND	GND	-
25	K2	#5	K2	#7
BLACK	PC1	-	P.C. BD.	TB2-6
BLACK	PC1	-	P.C. BD.	TB2-7
26	K2	#5	T1	H8

NOTE: ON POWER & CONTROL UNIT ASSY WHICH IS USED WITH LIGHT UNIT ASSY WITH NO TILT SWITCH, A JUMPER WIRE (#16 AWG MIN) MUST BE ADDED BETWEEN TB1 TERMINALS TILT SWITCH A & B FOR UNIT TO FUNCTION.

TABLE 3-3

SECTION 4. MAINTENANCE

4.1 PERIODIC MAINTENANCE

The PAPI System should be checked periodically as listed below:

<u>INTERVAL</u>	<u>ACTION</u>
Daily	Inspect for burned out lamps.
Weekly	a) Clean and inspect lenses, filters and reflectors. b) Replace broken or worn parts.
1 Month	a) Verify light unit elevations. b) Check tilt switch system by pulling one tilt switch cord. System should not stay on for more than 30 seconds. c) Check day/night photocell switching on Style A systems.
6 Months	a) Verify light unit alignment. b) Inspect cords and connections. c) Clean and touch-up paint as required. d) Perform periodic maintenance on PCU (Style A Systems).

4.2 CORRECTIVE MAINTENANCE

In general, Corrective Maintenance is performed by the replacement of parts rather than repair when they cease to function properly. The use of easily removable sub-assemblies facilitates repair. The removal and replacement procedure should be obvious to qualified maintenance personnel.



WARNING

WARNING:

Do not attempt repair or servicing without first removing power from the equipment. The use of lock-out devices is recommended for installations where the power distribution panel is not readily visible from the equipment location.

4.3 PROBLEM SOLVING GUIDE

The Problem Solving Guide which follows, along with the accompanying charts and diagrams, is provided to assist qualified airport maintenance personnel in locating and correcting equipment malfunctions if they occur. If further assistance is required, contact the Customer Service Department at Crouse-Hinds Airport Lighting Products, Windsor, Connecticut. To expedite service, please have all nameplate data from equipment prior to requesting assistance.

QUICK PROBLEM SOLVING CHECKLIST

SYMPTOM	WHAT TO DO
System will not turn on. No LEDs on.	(1) Check power source turned on (2) Check circuit breaker on PCU. (3) See PCU trouble shooting guide
System will not turn on or turns on then trips off. Some LEDs on.	(1) Check tilt switch circuit on Style B systems, "TILT" indicator on master unit. (2) On Style A systems - check load circuit continuity. (3) See PCU trouble shooting guide. (4) Check for all lamps bad - very rare problem.
One light unit does not light. Others are OK.	(1) Check lamps and connections. (2) Style B systems - possible faulty tilt switch board. See Style B trouble shooting guide.
Lights OK at low intensity, no change or small change when going to high.	(1) Style B systems - check load on constant current regulator for over load or too many bad lamps in circuit. (2) Style A systems - See PCU' trouble shooting guide.
Lights do not go to low intensity. Always in high.	(1) Style B systems - constant current regulator problem (2) Style A systems - see PCU trouble shooting guide.
Lights switch on and off erratically.	(1) Possible tilt switch delay problem. See PCU or Style B trouble shooting guide.
Lights change intensity frequently and/or unexpectedly.	(1) Style A systems - see PCU trouble shooting guide. (2) Style B systems - constant current regulator problem.
All option related problems.	See addendum for respective option at rear of this manual.
All other problems.	1) See PCU or Style B trouble shooting guide. (2) Contact factory.

PCU TROUBLE SHOOTING GUIDE

SYMPTOM	POSSIBLE PROBLEM & SOLUTION
<p>No operation. No LED's on.</p>	<p>(1) Blown fuse F1 on pc board. **Replace fuse** (2) Defective circuit board. **Replace 27138-X** (3) Defective CB1 or LA1 (Both very rare). **Replace**</p>
<p>No operation. DS1 is on. No other LED's on.</p>	<p>(1) Blown F2 on pc board. **Replace fuse** (2) Check for jumper wire from Remote A to Remote B on TB1 or check that the remote control switch is closed. (3) Defective circuit board. ** Replace 27138-X** (4) Short in coil of K1 or K2 (should read about 70 ohms) **Replace contactor if coil resistance is low**</p>
<p>No operation. DS1 & DS2 are on, DS4 is off.</p>	<p>(1) Tilt switch circuit is not complete. Check alignment and tilt switch wires. (3) Defective circuit board. **Replace 27138-X**</p>
<p>Day/Night operation. DS3 is on for night mode. DS3 is off for day mode.</p>	<p>(1) By Covering the photocell, DS3 should turn on immediately to indicate night mode. There will be a 60 second delay before a change in intensity. Uncovering the photocell or shinning a flashlight on it, DS3 should go off immediately. There will be a 60 second delay before a change in intensity.</p>

STYLE B PAPI TROUBLE SHOOTING GUIDE

SYMPTON	POSSIBLE PROBLEM & SOLUTION
One light unit does not operate.	(1) Check lamps and connections. If OK, pc board is bad. (See Note 1)
Lights switch on and off erratically.	(1) If one light unit is affected, check connections. If OK, pc board is bad. (See Note 1) (2) If "TILT" indicator on master pc board flickers, check tilt switches. (3) If all light units, check constant current regulator. If OK, pc board in Master unit is bad. (See Note 2)

NOTE 1 - It is possible in some cases to remove the relay on the pc board to temporarily restore operation. This is not recommended as a permanent solution, as the tilt switch shutdown for that light unit is not active when the relay is removed.

NOTE 2 - To facilitate immediate restoration, the pc board from any other unit can be swapped with the master unit. This may allow complete or partial system restoration, depending upon exactly which component on the bad pc board is faulty.

4.4 RELAMPING PROCEDURES



WARNING

WARNING:

Do not attempt repair or servicing without first removing power from the equipment. The use of lock-out devices is recommended for installations where the power distribution panel is not readily visible from the equipment location.

4.4.1 Removal of the Lamp

After power to the unit has been secured, remove the cover from the PAPI Light Unit Assy. Refer to View C in Figure 4-6, remove the Socket Retainer, item 33, holding the Lamp Socket, item 27.



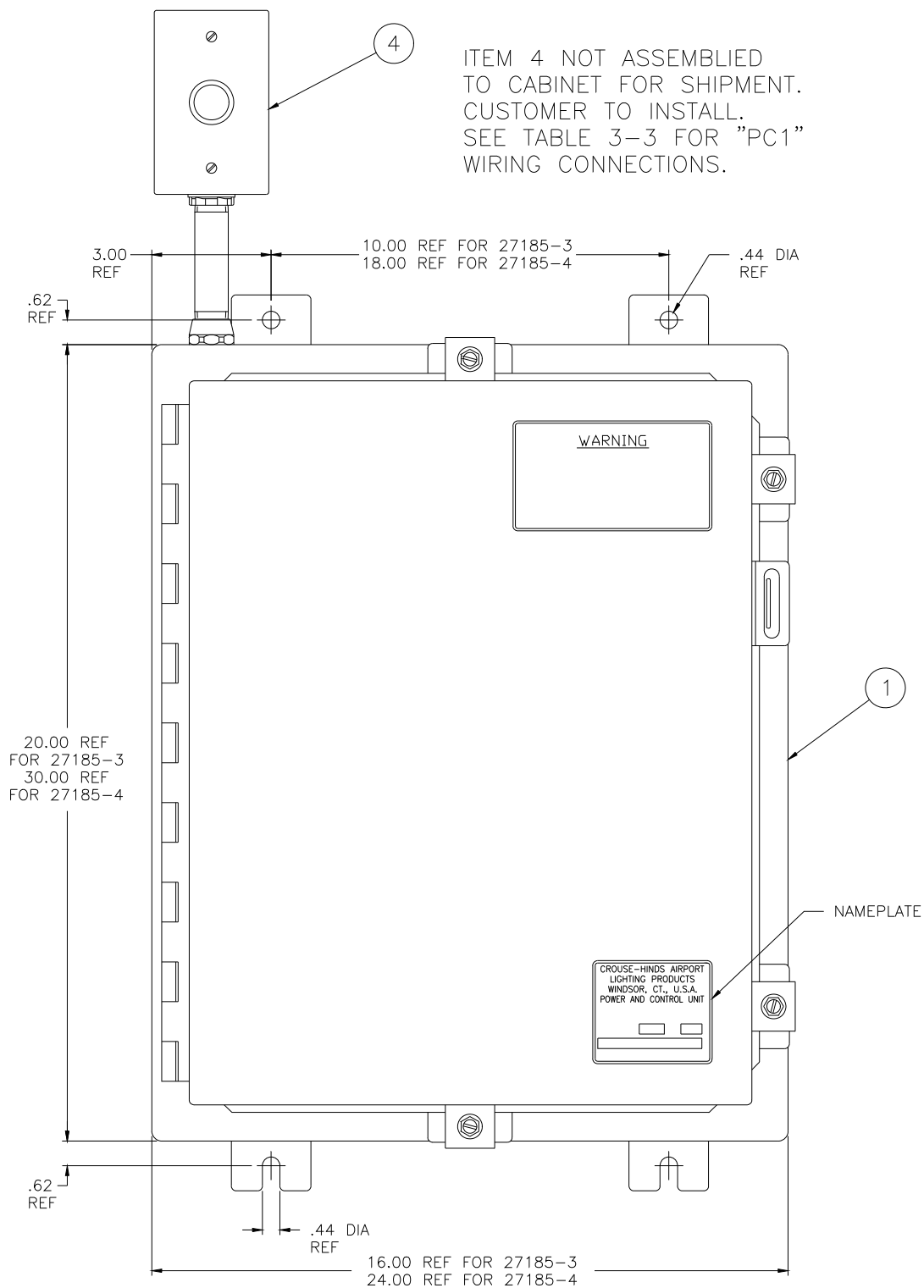
CAUTION

CAUTION:

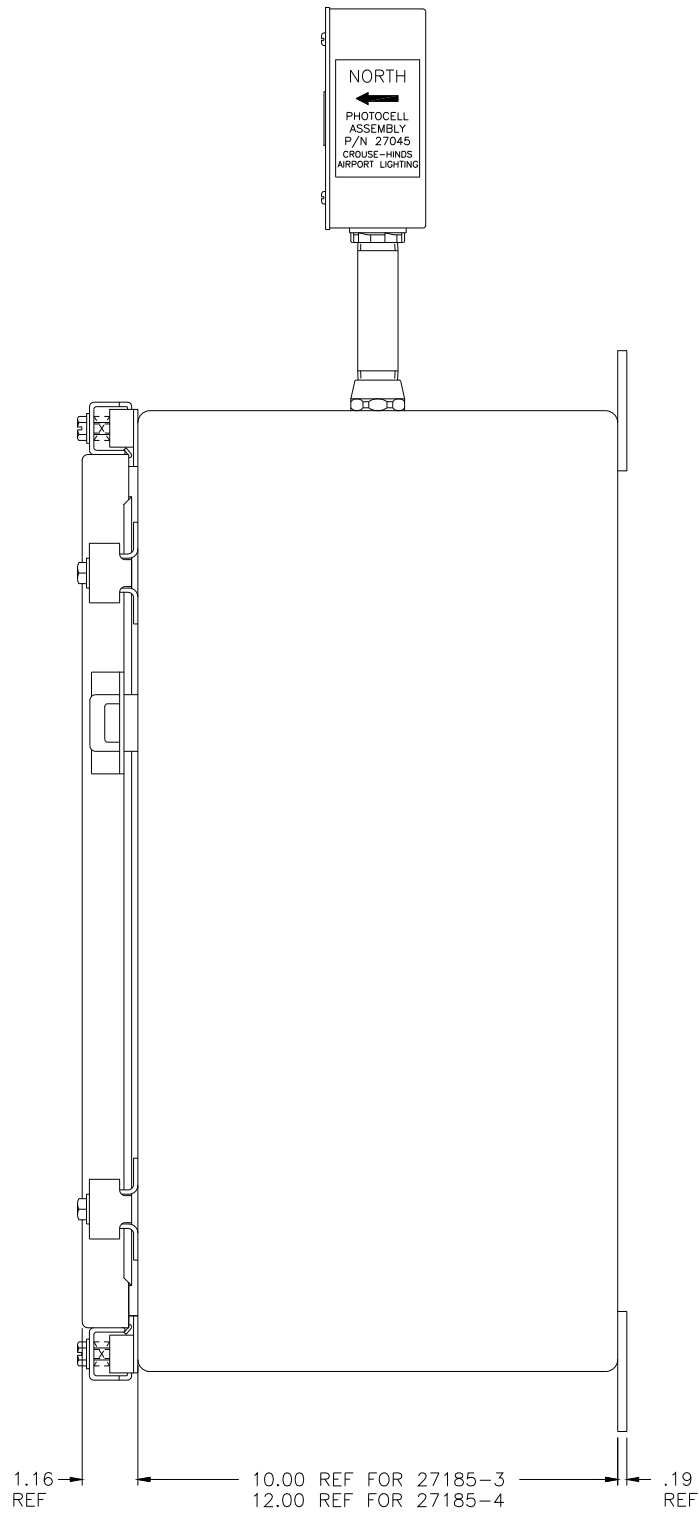
Retainer, Socket, and Lamp may be extremely hot and can cause burns.

4.4.2 Replacing the Lamp

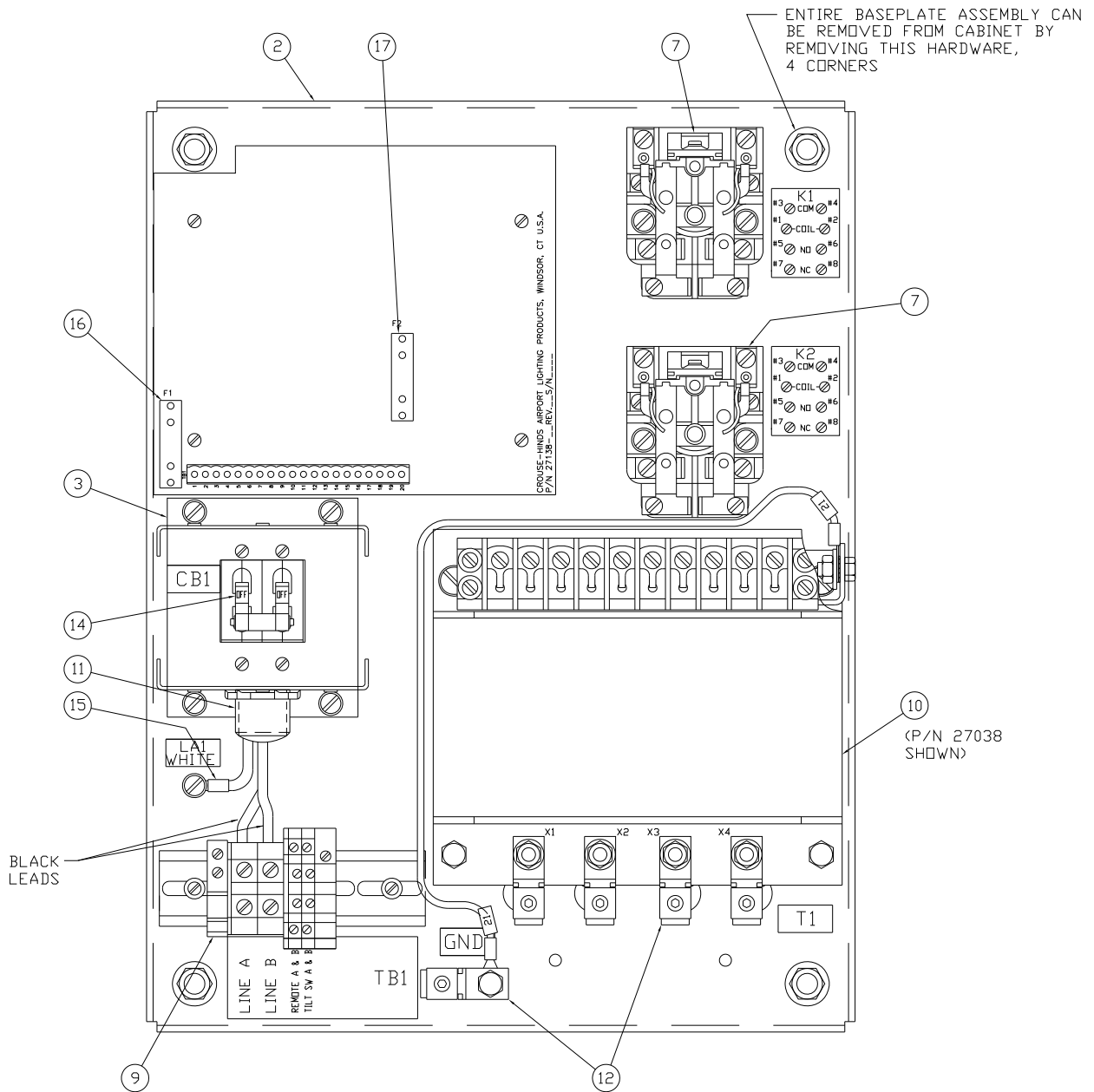
Install the new Lamp, item 20, into the Lamp Socket. Reposition the Lamp Socket into the cutout in the Lamp Bracket. Make sure the Lamp Socket is arranged so that the terminals face the Tilt Switch side of the box. Secure the Lamp Socket, item 27, with the Socket Retainer, item 33. Make certain the Lamp Socket is secure. Put the cover back on the PAPI Light Unit and secure. Energize the Light Unit and check for light output.



CONTROL CABINET FRONT VIEW
POWER & CONTROL UNIT ASSY
FIGURE 4-1



CONTROL CABINET SIDE VIEW
POWER & CONTROL UNIT ASSY
FIGURE 4-2



BASEPLATE COMPONENTS MOUNTING DETAILS
POWER & CONTROL UNIT ASSY 27185-4
FIGURE 4-3A

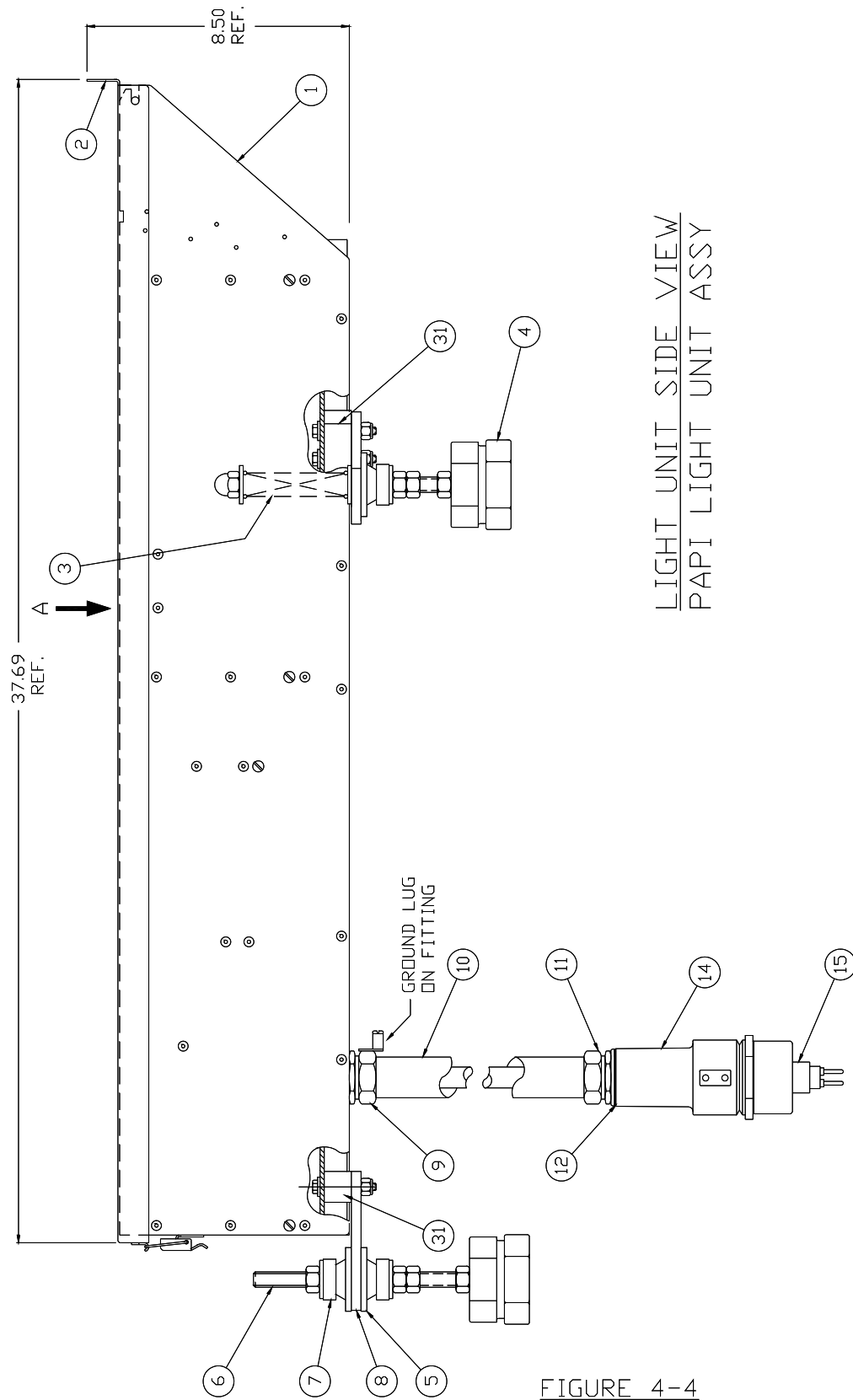
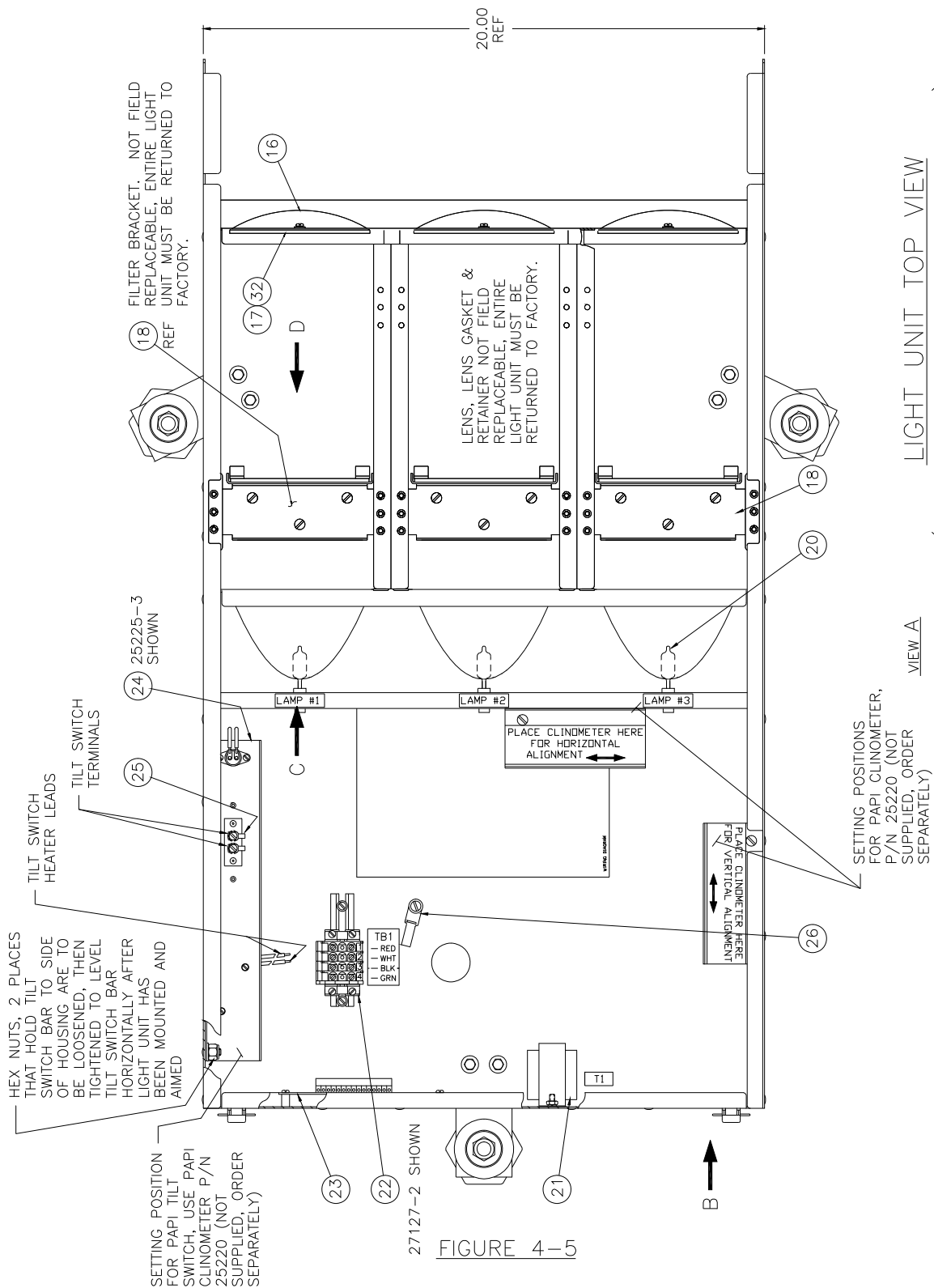
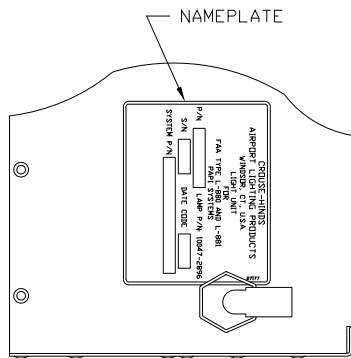
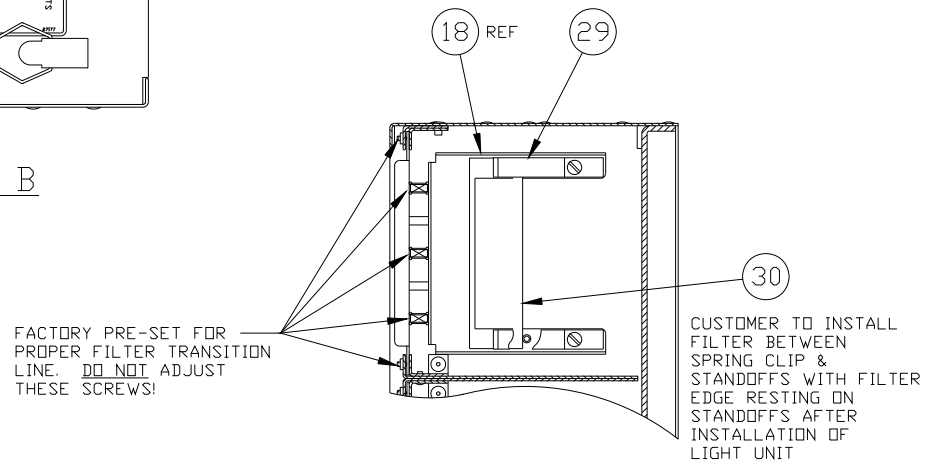


FIGURE 4-4

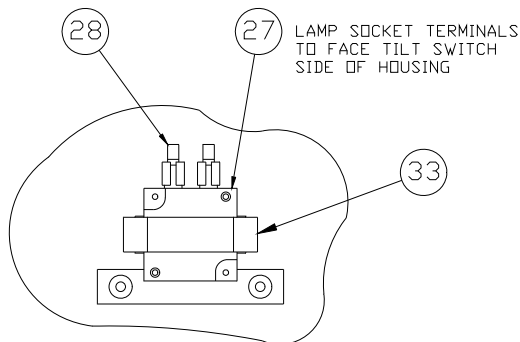




VIEW B



VIEW D
TYPICAL 2 PLACES



VIEW C
TYPICAL 2 PLACES

LIGHT UNIT VIEWS
PAPI LIGHT UNIT ASSY

FIGURE 4-6

SECTION 5. PARTS LIST

5.1 SCOPE

The Parts Lists provide ordering data for all repairable or replaceable components and assemblies. The Figures and Tables are arranged to show each replaceable part or assembly. The parts are identified in each Figure by Item Number. The Item Number appears in the corresponding Parts List, which also provides the part number and description.

5.2 LIST OF FIGURES

Figure 4-1: PCU-Front View
Figure 4-2: PCU-Side View
Figure 4-3: PCU-Base Plate Components
Figure 4-4: Light Unit-Side View
Figure 4-5: Light Unit-Top View
Figure 4-6: Light Unit-Detail Views

5.3 PARTS LIST

Table 5-1: Power and Control Unit (PCU)
Table 5-2: Light Unit Assembly-Page 1
Table 5-3: Light Unit Assembly-Page 2

PARTS LIST
POWER & CONTROL UNIT ASSY

ITEM NUMBER	REF DESIG	QUANTITY		DESCRIPTION	CROUSE-HINDS PART NO.	MANUFACTURERS PART NO.
		27185-3	27185-4			
1		1	-	CONTROL CABINET	27040	
1		-	1	CONTROL CABINET	27129	
2		1	-	BASEPLATE	27021	
2		-	1	BASEPLATE	27130	
3		1	1	CIRCUIT BREAKER BRACKET ASSY	27022	
4	PC1	1	1	PHOTOCELL ASSEMBLY	27045	
5				NOT USED		
6		1	1	P.C. BOARD ASSY, PCU CONTROL	27138-1	
7	K1, K2	1	1	RELAY, DPDT	10047-2901	P&B PRD-11DYO-12 MAGNECRAFT W199X-12
8				NOT USED		
9	TB1	1	1	TERMINAL BLOCK ASSY	27041	
10	T1	1	-	TRANSFORMER, 1800 VA	27038	
		-	1	TRANSFORMER, 2800 VA	27120	
11	LA1	1	1	LIGHTNING ARRESTOR	10047-885	G.E. 9L15ECB001
12		3	5	SOLDERLESS LUG, #4-14 AWG	10047-1933	ILSCO SAU 70
13				NOT USED		
14	CB1	1	1	CIRCUIT BREAKER	10047-704	P&B WOOD ELEC. W92X11-2-20
15		1	1	TERMINAL, RING, #10 STUD, #16-14 AWG	10047-1448	AMP 322238
*16	F1	1	1	FUSE, .125 AMP, SLO-BLO	10047-1005	LITTLEFUSE 313.125 BUSS MDL 1/8
*17	F2	1	1	FUSE, .5 AMP, SLO-BLO	10047-1143	LITTLEFUSE 313.500 BUSS MDL 1/2

TABLE 5-1

*ITEMS 16 & 17 INCLUDED IN ITEM 6 P.C. BOARD ASSY

PARTS LIST
PAPI LIGHT UNIT ASSY

ITEM NUMBER	REF DESIG	QUANTITY										DESCRIPTION	CROUSE-HINDS PART NO.	MANUFACTURERS PART NO.		
		-1	-2	-3	-4	-5	-6	-7	-8	-9						
1	*	1	1	1	1	1	1	1	1	1	1	1	1	HOUSING SUB-ASSY	27180	
2		1	1	1	1	1	1	1	1	1	1	1	1	COVER ASSEMBLY	27118	
3		2	2	2	2	2	2	2	2	2	2	2	2	COMPRESSION SPRING	10037-467	SPRING IND. INC. C720-4000-16000
4		3	3	3	3	3	3	3	3	3	3	3	3	CAP ASSY	25876	
5		4	4	4	4	4	4	4	4	4	4	4	4	CUP, BALL JOINT	25618	
6		3	3	3	3	3	3	3	3	3	3	3	3	THREADED ROD	25878	
7		4	4	4	4	4	4	4	4	4	4	4	4	BALL JOINT HALF	25617	
8		3	3	3	3	3	3	3	3	3	3	3	3	LEG BRACKET	27009	
9	** , ***	1	1	1	1	1	1	1	1	1	1	1	1	CONDUIT FITTING, LIQ. TIGHT, W/ GND STUD, 1"	10037-468	CROUSE-HINDS ECM LTB100-G
10	** , ***	1	1	1	1	1	1	1	1	1	1	1	1	LIQ. TIGHT FLEX METAL CONDUIT, 8 FT LG	10037-471	AMACONDA, METAL HOSE SEALITE 1 TYPE HCX
10	***	-	-	-	-	-	-	-	-	-	-	-	-	LIQ. TIGHT FLEX METAL CONDUIT, 5 FT LG	10037-471	AMACONDA, METAL HOSE SEALITE 1 TYPE HCX
11	** , ***	1	1	1	1	1	1	1	1	1	1	1	1	CONDUIT FITTING, LIQ. TIGHT FLEX METAL, 1"	10037-469	CROUSE-HINDS ECM LTB100
12	** , ***	1	1	1	1	1	1	1	1	1	1	1	1	SEALING RING, 1"	10037-470	CROUSE-HINDS ECM SC3
13														NOT USED		
14	** , ***	1	1	1	1	1	1	1	1	1	1	1	1	FRANGIBLE COUPLING, 2"	60683-9	
15	** , ***	1	1	1	1	1	1	1	1	1	1	1	1	CONNECTOR, MALE PLUG, 4/#14 AWG	10037-533	
15	***	-	-	-	-	-	-	-	-	-	-	-	-	CONNECTOR	40919-6	
16	*	3	3	3	3	3	3	3	3	3	3	3	3	LENS	27017	
17	*	3	3	3	3	3	3	3	3	3	3	3	3	LENS RETAINER	27192	
18	*	3	3	3	3	3	3	3	3	3	3	3	3	FILTER BRACKET	27199	

TABLE 5-2

* ITEMS INDICATED FOR REFERENCE ONLY, NOT FIELD REPLACEABLE
 ** ITEMS PART OF 27102, POWER ENTRY KIT
 *** ITEMS PART OF 27135, POWER ENTRY KIT, OPT -21

PARTS LIST
PAPI LIGHT UNIT ASSY

ITEM NUMBER	REF DESIG	QUANTITY									DESCRIPTION	CROUSE-HINDS PART NO.	MANUFACTURERS PART NO.
		-1	-2	-3	-4	-5	-6	-7	-8	-9			
19													
20		3	3	3	3	3	3	3	3	3	3	10047-2896	
21	T1	-	-	1	1	-	-	-	-	-	-	31329	
22	TB1	-	-	-	-	-	-	1	-	-	-	27127-1	
		-	-	1	1	1	1	-	1	-	-	27127-2	
		1	1	-	-	-	-	-	-	1	-	27127-3	
23		-	-	1	1	1	1	-	-	-	-	27123-2	
		-	-	-	-	-	-	-	-	1	-	27123-3	
24		1	-	1	-	1	-	-	-	-	-	25225-1	
		-	-	-	1	-	1	-	-	-	-	25225-3	
		-	1	-	-	-	-	-	-	-	-	25225-4	
25		2	2	2	2	2	2	2	2	2	10047-837	AMP 322777	
26		1	1	1	1	1	1	1	1	1	10053-166	THOMAS & BETTS TY537M	
27		3	3	3	3	3	3	3	3	3	40749		
28		6	6	6	6	6	6	6	6	6	10047-381	HOLLINGSWORTH S09704S	
29	*	6	6	6	6	6	6	6	6	6	27067		
30		3	3	3	3	3	3	3	3	3	27069		
31		3	3	3	3	3	3	3	3	3	27089		
32	*	3	3	3	3	3	3	3	3	3	10035-46		
33		3	3	3	3	3	3	3	3	3	40911		

TABLE 5-3

* ITEMS INDICATED FOR REFERENCE ONLY, NOT FIELD REPLACEABLE

RECOMMENDED SPARE PARTS LIST **
PAPI LIGHT UNIT ASSY, P/N 27175-X
STYLE A & B SYSTEMS

CROUSE-HINDS PART NO.	QUANTITY PER LIGHT UNIT									DESCRIPTION	
	-1	-2	-3	-4	-5	-6	-7	-8	-9		
* 27179	1	1	1	1	1	1	1	1	1	1	PAPI LIGHT UNIT SPARE (3 LAMP)
10047-2896	3	3	3	3	3	3	3	3	3	3	LAMP, 200 W, 6.6A
27069	3	3	3	3	3	3	3	3	3	3	FILTER
40749	3	3	3	3	3	3	3	3	3	3	LAMP SOCKET
25225-1	1	-	1	-	1	-	-	-	-	-	TILT SWITCH ASSY (-35°C)
25225-3	-	-	-	1	-	1	-	-	-	-	TILT SWITCH ASSY (-55°C, STYLE B)
25225-4	-	1	-	-	-	-	-	-	-	-	TILT SWITCH ASSY (-55°C, STYLE A)
27127-1	-	-	-	-	-	-	1	-	-	-	TERMINAL BLOCK ASSY (2 POSITION)
27127-2	-	-	1	1	1	1	1	-	1	-	TERMINAL BLOCK ASSY (4 POSITION)
27127-3	1	1	-	-	-	-	-	-	-	1	TERMINAL BLOCK ASSY (6 POSITION)
27123-2	-	-	1	1	1	1	1	-	-	-	TILT SWITCH CONTROL BOARD
27123-3	-	-	-	-	-	-	-	-	1	-	TILT SWITCH CONTROL BOARD
31329	1	1	1	1	1	1	1	1	1	-	TRANSFORMER
10047-2316	1	1	1	1	1	1	1	1	1	-	JUMPER, TERMINAL BLOCK, 2 POS.
40911	3	3	3	3	3	3	3	3	3	3	RETAINER, SOCKET

TABLE 5-4

* THE FOLLOWING PARTS ARE ALSO INCLUDED IN THE 27179 SPARE LIGHT UNIT
NOTE: THE ABOVE QUANTITIES ARE BASED UPON ONE (1) LIGHT UNIT. AN 880A3X SYSTEM
CONSISTS OF FOUR (4) LIGHT UNITS. AN 881A3X SYSTEM CONSISTS OF TWO (2) LIGHT UNITS
CALCULATE THE TOTAL PARTS QUANTITIES ACCORDINGLY.
** SUGGESTED INITIAL AND MAINTAINED STOCK LEVEL.

RECOMMENDED SPARE PARTS LIST **
 POWER & CONTROL UNIT ASSY, P/N 27185-X
 STYLE A SYSTEMS ONLY

CROUSE-HINDS PART NO.	QUANTITY		DESCRIPTION
	-3	-4	
27045	1	1	PHOTOCELL ASSEMBLY (PC1)
NOT USED			
27138-X	1	1	P.C. BOARD ASSEMBLY, PCU CONTROL
10047-2901	1	1	RELAY, DPDT (K1, K2)
27041	1	1	TERMINAL BLOCK ASSEMBLY (TB1)
27038	1	-	TRANSFORMER, 1800 VA, 60 Hz (T1)
27120	-	1	TRANSFORMER, 2800 VA, 60 Hz (T1)
10047-885	1	1	LIGHTNING ARRESTOR (LA1)
10047-704	1	1	CIRCUIT BREAKER (CB1)

TABLE 5-5

NOTE: THE ABOVE QUANTITIES ARE BASED UPON ONE (1) PCU UNIT. EACH 88XA3A SYSTEM INCLUDES ONE (1) PCU.

** SUGGESTED INITIAL AND MAINTAINED STOCK LEVEL.

APPENDIX A

INDEPENDENT METHOD OF VERIFYING PAPI GLIDE SLOPE ANGLE

- A1. Locate a point (A) 25 ft. and another point (B) 50 ft. in front of each PAPI unit. Each PAPI unit will have either two or three projectors. See Figure 1.
- A2. At each location, drive a stake into the ground. Use a transit to align the top of each stake to the same level. The stake tops should be no higher than the PAPI mounting height. See Figure 1.
- A3. Obtain a wooden board having the approximate dimensions: 1" thick, 8" wide, and 6' long. Drill 3/16" diameter holes (make sure the edges are clean) along the centerline at 1/2" intervals. See Figure 2.
- A4. Place the board vertically on top of Stake A.
- A5. Adjust the PAPI light output to its lowest intensity level.
- A6. Stand in front of the board and peer through the holes looking at the PAPI unit light output.
- A7. Find the hole through which each PAPI projector in the unit appears to be half red and half white. All two or three projectors on the same unit should appear to change color at approximately the same time. Be as precise as you can and mark the hole through which the unit appears half red and white.
- A8. Record the distance from the top of the stake to the hole. This is dimension X. See Figure 3.
- A9. Repeat Steps 4 through 8 for Stake B. The distance from the top of the stake to the hole is dimension Y. See Figure 3.
- A10. Calculate the tangent of the glide slope by using the following formula. Y and X are in feet or inches as shown below.

$$\text{Tan } () = \frac{(Y-X)}{25 \text{ ft.}} \text{ or } \frac{(Y-X)}{300 \text{ inches}}$$

- A11. Convert the Tangent () to the actual degrees by using a calculator or Trigonometric Table.
- A12. Compare the actual angle with the clinometer reading for that PAPI unit. If there is more than a plus or minus 0 degree 10 minute variation, call Crouse-Hinds for assistance.
- A13. If your PAPI System is set at the standard glide angles listed below, then there is no need to convert to degrees. Compare your (y-x) dimension with those given and if you find a variation of more than ±1 inch, please call for assistance.

APPENDIX A (CONT'D)
TABLE OF ANGLES
AND CHECKING DIMENSIONS

PAPI UNIT	STANDARD PAPI ANGLES	(Y-X) INCHES	(Y-X) FEET
1	3° 30'	18.3	1.53
2	3° 10'	16.6	1.38
3	2° 50'	14.8	1.24
4	2° 30'	13.1	1.09

NOTE: A) PAPI unit one is closest to the runway.
 B) Tolerance is ± 1 inch or ± 0.08 feet.

A14. Repeat this procedure for all other PAPI units.

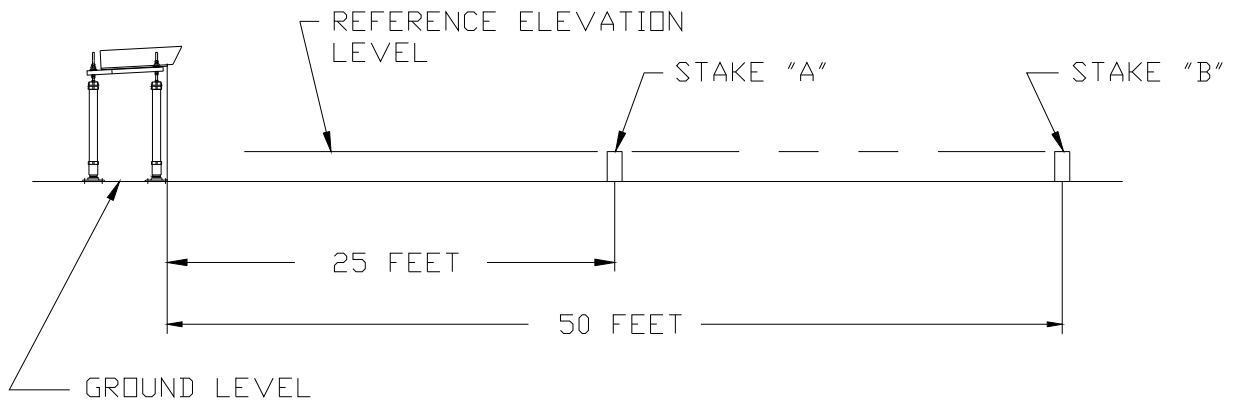


FIGURE 1

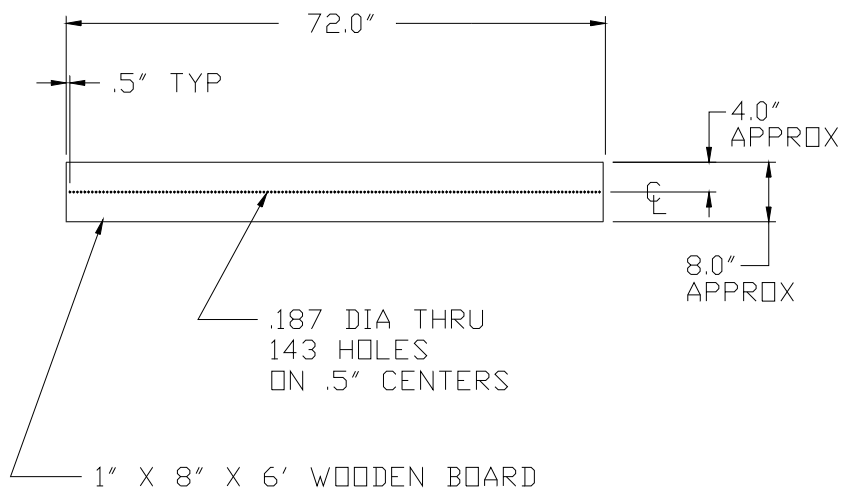


FIGURE 2

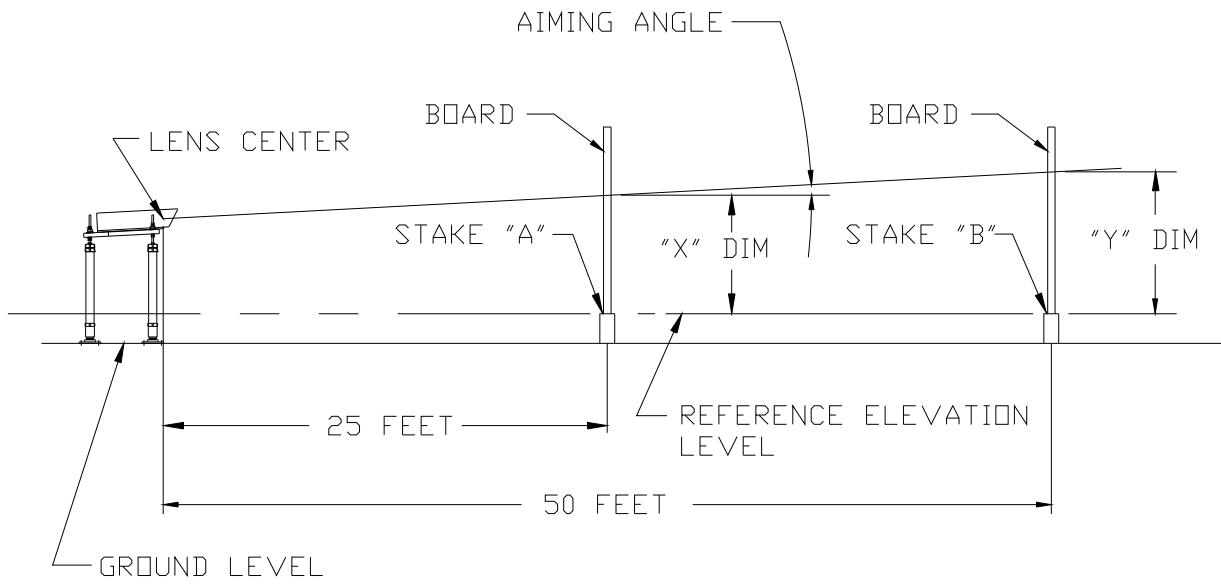


FIGURE 3