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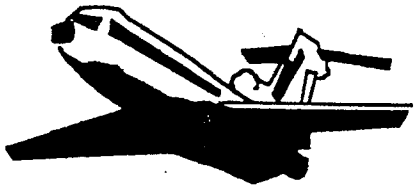

Since 1946

Document No. 96A0136
Issued: 3/18/91
Rev. E Date 01/30/96

INSTRUCTION MANUAL

STYLE A
L-880/L-881 PAPI

PRECISION APPROACH PATH INDICATOR
(VOLTAGE POWERED)

Manufactured per FAA Specification
AC 150/5345-28D

ADB

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Additional manuals are available upon request for a nominal charge of $25.

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SAFETY NOTICES

The operating and maintenance personnel should refer to FAA Advisory Circular AC 150/5340-26, "Maintenance of Airport Visual Aids Facilities" for instructions on safety precautions. Personnel must observe the safety regulations at all times. While every practicable safety precaution has 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. To avoid casualties, always remove power prior to making any wire connections and touching any parts. See FAA Advisory Circular AC 150/5340-26 concerning safety.

RESUSCITATION

Operating and maintenance personnel should familiarize themselves with the technique for resuscitation found in the First Aid Instruction Manual.

WARRANTY

ADB, Inc. warrants that the L-880/L-881 Precision Approach Path Indicator (PAPI) systems described herein, when sold by ADB, Inc. or its approved representatives, will perform in accordance with FAA specification AC 150/5345-28, Precision Approach Path Indicators, and that any defect in design, materials or workmanship which may occur during proper and normal use during a period of one (1) year from date of installation or a maximum of two (2) years from date of shipment will be corrected by repair or replacement by ADB, Inc., f.o.b. factory. Damage resulting from improper installation does not constitute proper and normal use and is not covered by the warranty. Such corrections shall constitute the limit of all ADB, Inc. liabilities.

1. GENERAL INFORMATION AND REQUIREMENTS

1.1 INTRODUCTION

This manual describes procedures for the installation, operation, maintenance, and troubleshooting of the Style A, L-880/L-881 Precision Approach Path Indicator (PAPI) systems which are used to provide visual approach path guidance to pilots of landing aircraft. The PAPI system is designed to operate from a 120 V ac single-phase, 60 Hz power supply or optionally from 240 V ac.

1.2 TYPE L-880 PAPI SYSTEM

See Figures 8-1 & 8-2. The L-880 PAPI system consists of four identical light units which are normally installed on the left side of the runway (viewed from the approach end) in a line perpendicular to the runway centerline. The units are aimed so that during a landing approach the pilot will see the following signal format:

a. The inner two units are red and the outer two units as white when the aircraft is close to or on the approach slope.

b. The unit nearest the runway as red and the three units farthest from the runway as white when above the approach slope; all four units will appear white if the aircraft is excessively above the approach slope;

c. The three units closest to the runway will be seen as red and the unit farthest from the runway as white if the aircraft is slightly below the approach slope; and still further below, all the units will appear red.

1.3 TYPE L-881 PAPI SYSTEM

See Figures 8-1 & 8-2. The L-881 PAPI system consists of two identical light units which are normally installed on the left side of the runway (viewed from the approach end) in a line perpendicular to the runway centerline. The units are aimed so that during a landing approach the pilot will see the following signal format:

a. Both units as red when the aircraft is below the approach slope;

b. The unit nearest the runway as red and the other unit as white when on or close to the approach slope;

c. Both units as white when the aircraft is above the approach slope.

1.4 THE PAPI LIGHT UNIT

A single PAPI light unit contains two 6.6A/200W lamps, two reflectors and red filters, four lenses, and a lens shield; and a tilt switch assembly attached to the rear of the unit. The PAPI unit is mounted on four adjustable legs. See Figures 8-5 and 8-8.

1.4.1 Lamps

Two 200-watt prefocused halogen lamps are located in the rear of the unit, each in an indexed lampholder in a reflector and held in place with a forked spring clip. Slip-on type electrical connections permit easy replacement of failed lamps.

1.4.2 Reflector Panel

The reflector panel is fitted with two apertures in which the elliptical reflectors are housed. The reflectors are made of aluminum which is mechanically polished for brilliance and anodized for protection.

1.4.3 Filter Panel

The filter panel houses the two red filters. It also has two reference slots, C and D, used to locate the aiming device for making field adjustments of the light unit (see Fig. 8-5). These reference slots are precision machined in the factory. Be careful not to damage these machined slots.

1.4.4 Lens Panels

Four high optical quality objective lenses are housed in two lens panels. The upper rim of the front lens panel is equipped with two reference blocks, A and B, for field adjustment of the light unit. These blocks are precision adjusted in the factory to be parallel with the optical centerline of the objective lenses.

1.4.5 Lens Shield

The flat glass shield (protective glass) serves to protect the lenses against sand, stone, etc., and is designed to avoid reflections.

1.4.6 Adjustable Mounting Legs

See Figure 8-6. The four adjustable mounting legs are each made up of two screw rods connected by a differential sleeve. The upper (smaller diameter) rod is fitted with nuts and locking nuts designed for coarse height setting of the unit. The differential sleeve is used for the fine adjustment setting of the unit. The lower (larger diameter) rod is inserted into a conduit column with frangible coupling held in place by a flange bolted on a concrete pad.

1.4.7 Tilt Switch

The tilt switch assembly is designed to deenergize the lamps if the optical pattern is raised between 1/2° and 1° or lowered between 1/4° and 1/2° with respect to the present setting angle of the light unit. A time delay of 10-30 seconds is incorporated to prevent intermittent tilt switch activation due to vibration. The tilt switch assembly has a failsafe operation so that any malfunction of the switch including loss of power deenergizes the lamp circuits controlled by the tilt switch.

1.5 MASTER BOX ASSEMBLY

The master box assembly is used in single-phase voltage-powered systems to convert the 120 V ac supply voltage to 30.3 V ac to operate the lamps (which are in parallel) in the PAPI slave units. A photoelectric control on the master provides full intensity during the day and a reduced intensity (20% or 5%) at night. The daytime mode is activated when the illumination on the photocell rises to 50-60 footcandles; and the nighttime mode is activated when the illumination drops to 25-35 footcandles. See Figures 8-9 and 8-10.

1.6 INSTRUMENTS FOR INSTALLATION AND VERIFICATION

The following instruments are required for installation, leveling, setting, and checking the elevation setting of the light units.

a. One survey instrument (aiming device) for azimuth and elevation setting;

b. One precision bubble level for leveling the units;

c. One checking stick for routine checks of the elevation setting.

1.6.1 Aiming Device

See Figures 8-11 and 8-18. The aiming device consists of:

a. One base to rest on reference block B and slot C; and two movable arms to rest on reference block A and slot D;

b. Two graduated scales for elevation setting;

c. One bar used for the longitudinal horizontal reference required to set both azimuth and elevation.

The two movable arms increase the stability of the aiming device and are used to establish the transverse horizontal references. Screws are provided on the bar and on the movable arms to guarantee and exact positioning of the level during setting and adjustment. This exact positioning is required in order to have a perfect match between the level and the longitudinal and transverse horizontal references. The two V-sites on the bar of the aiming device are for azimuth alignment.

1.6.2 Bubble level

This instrument has a 0.004 in/ft (0.3 mm/m) degree of precision which allows a very precise setting (within one minute of arc) compatible with the design precision of the PAPI light unit.

1.6.3 Checking Stick

See Figure 8-12. The checking stick is used to make routine checks of the elevation setting of the PAPI units. It consists of a small transparent screen attached to a lightweight rod. The screen has two horizontal lines 23 mm (0.09") apart to correspond to approximately 3 minutes of arc at 25 m (82 ft). See Section 7.17.2 for instructions on using the checking stick.

1.7 EQUIPMENT SPECIFICATION DATA

The ADB part numbers for the Style A PAPI systems are given in Table 1-1. Table 1-2 provides reference data pertinent to the equipment. Table 1-3 lists the equipment and accessories supplied. Items not supplied which might be required for installation are given in Table 1-4.

1.8 PHOTOMETRICS

See Figs. 8-13 and 8-14. Each light unit used in the L-880/L-881 PAPI systems has two lamps and provides a beam of light split horizontally to produce white light in the top sector and red light in the bottom sector. When viewed by an observer at a distance of 1000 feet, the transition from red light to white light occurs within an angle of three minutes of arc at the beam center and within an angle of five minutes of arc at the beam edges.

Figure 8-14 shows the results of measurements made on a typical PAPI unit. The horizontal line of the cut-off plane between the white and red parts of the light beam occurs at the vertical angle of 0°. The horizontal distribution of light intensity is shown in two planes: +1° above the cut-off plane (into the white part of the beam), and -1° below the cut-off plane (into the red part of the beam).

The horizontal distribution shows that the light intensity remains almost constant over a very wide beam spread (flat shape over more than 10 degrees) which is an advantageous optical feature of the ADB PAPI unit obtained by the use of elliptical reflectors.

Table 1-1. L-880/L-881 Style A PAPI Part Numbers

44A1418 - X X

1 = With Heater 2 = Without Heater	
	1 = L-880 (4 Box) 2 = L-881 (2 Box)

☑ **Note**: The interlock relay option (see Section 7.19) will turn the PAPI on only when the runway lights are on and at the proper current level. The interlock relay option must be ordered separately. When ordering use the following part number for the interlock relay option:

94A0032-1 (for use on a 6.6A series circuit)
94A0032-2 (for use on a 20A series circuit)

Table 1-2. Equipment Data

Type.....Style A (Voltage Powered)—L-880 (4 box)/L-881 (2 box)

Input.....30.3 V ac at 6.6 A (lamps); 120 V ac ±10%, 60 Hz (master only)

Lamps .....Two 200 W/6.6 A quartz lamps per PAPI unit
Rated Lamp Life: 1000 hours
Luminous Intensity (white light): 138,500 cd (peak); 135,200 cd (avg., 10° horiz. beam spread)
Lamp Part Number: ADB #48A0077; OSRAM #64382

Transmission Factor
of Red Sector.....at least 15%

Transmission Sector.....3 minutes of arc (over full beam spread)

Visual Acquision Range.....7.1 miles (within an approach envelope of ±5° from the approach axis)

Transient Suppression.....Solid state equipment is capable of withstanding lightning transient consisting of a 10 x 20 microsecond current surge of 15,000 amperes with the subsequent power-follow current and voltage surge of 10 kV/microsecond. System also will withstand without damage the repeated application of an overvoltage transient on the input power lines equal to 500 volts peak for a duration of 50 milliseconds.

Tilt Switch.....Deenergizes all lamps in PAPI system if optical pattern of any light unit is raised between 1/2° and 1° or lowered between 1/4° and 1/2°.

Mean Time
Between Failure .....6 months (minimum) for all components (excluding lamps)

Environmental Operating Conditions:
Temperature Range of Operation:
Class 1 .....-35°C to +55°C (-31°F to +131°F)
Class 2 .....-55°C to +55°C (-67°F to +131°F)

Humidity .....0 to 100%

Wind .....Velocities up to 100 mph (161 km/h)

Mounting Provisions .....4 mounting legs

Dimensions .....See Figure 8-1

Weight.....93 lb (approx.) per light unit; 145 lb (approx.) for master

Table 1-3. Equipment Supplied

L-880 PAPI System		L-881 PAPI System	
Quantity	Description	Quantity	Description
1	Master Box Assembly	1	Master Box Assembly
1	Slave #1 Assembly	1	Slave #1 Assembly
1	Slave #2 Assembly	1	Slave #2 Assembly
1	Slave #3 Assembly	1	Instruction Manual
1	Slave #4 Assembly		
1	Instruction Manual		

Table 1-4. Equipment Required but not Supplied (unless ordered as an option)

Quantity	Description
1	Aiming Device Kit[1] (supplied as an option)
1	Positioning Plate (see Fig. 8-17)
1	Field Splice Kit[2] (94A0017-1 for L-880) (94A0017-2 for L-881) (supplied as an option)
1	Survey Instrument
4 (L-880)	L-867 (16-inch diameter) Light Base[3] [3]
2 (L-881)	L-867 (16-inch diameter) Light Base[3]
4 (L-880)	L-867 Base Plate (3 Hub)
2 (L-881)	L-867 Base Plate (3 Hub)
6	1 1/4-inch Flex Conduit/Fluid Tight Male Connector[4]
3	1 1/2 x 1 1/4-inch Hex Reducer Bushing[4]
3	1 1/4-inch Flex Conduit/Fluid Tight[4]
2	Slipfitter[5]
2	2-inch Coupling[5]
2	Frangible Couplings[5]
2	2-inch 90° Elbows[5]
1	Interlock Relay (see Section 7.19 and note following Table 1-1)
A/R	Concrete

☑ **Note**: The nominal L-823 cordset length is 31 inches. Since the length required for installation will depend on the height of the PAPI unit and the distance of the bottom of the unit from the wire entry point in the can or conduit, the customer should check the length required. If a longer cordset is required, the wires may be spliced (in accordance with local codes) or a longer cordset may be ordered. Contact ADB Sales department.

[1] The aiming device kit (44A0933) includes three instruments: aiming device, checking stick, and precision bubble level supplied in a wooden box.
[2] See Table 6-1 for items in field splice kits #94A0017-1 and #94A0017-2. See Figs. 8-24 and 8-25.
[3] A 2-inch 90 degree conduit elbow may be used instead of an L-867 base as shown in Figs. 8-24 and 8-25.
[4] Items supplied by contractor (per PAPI light box). See Figs. 8-24 and 8-25.
[5] Items required for Master Box installation. See Fig. 8-16.

2. THEORY OF OPERATION

2.1 Master

120 V ac is supplied to the master box at terminal block TB5-5 and TB5-6. TB5-6 is the neutral line. TB5-5 is fed through varistor VR1 to provide lightning protection. 120 V ac is fed through circuit breaker CB1 and fuse F1. These provide overcurrent protection. If the tilt switches are closed, 120 V ac is fed through fuse F3 into transformer T2 and is stepped down to 24 V ac. This voltage is used to power the time-delay-off relay K2. When the tilt switches are closed and switch S1 is in the proper position, contactor K1 is energized. This contactor then provides 120 V ac to transformer T1, which is fused by F1. Transformer T1 converts 120 V ac to 30.3 V ac at 6.6 amps to power the PAPI lamps. The intensity of the lamps at night depends on the position of wire #203. See Figures 8-10, 8-20 to 8-23, and 8-26.

2.2 DAYTIME OPERATION

When the illumination on the photocell rises to 50-60 footcandles, the photocell PC1 will be deenergized. This releases K4 (normally closed) and provides 120 V ac to the coil of contactor K3. When contactor K3 is energized, the 100% tap coming from T1 is selected and turns on the PAPI lamps to full intensity via TB5-1, -2, -3 and -4. See Figures 8-22, 8-23 and 8-26.

2.3 NIGHTTIME OPERATION

When the illumination drops to 25-35 footcandles, photocell PC1 will provide 120 V ac to K4 which removes 120 V ac from K3 and selects the low intensity tap from T1 (intensity depends on S2 position), turning on the PAPI lamps to low intensity via TB5-1, -2, -3 and -4. See Figs. 8-9, 8-22, 8-23 and 8-26. A time delay of 45-75 seconds is incorporated in the photoelectric control to prevent switching due to stray light or temporary shadows. In case of failure of the photoelectric control circuitry, the system reverts to low intensity. Two night intensity settings, approximately 5% and 20% full intensity, can be set by placing wire #203 (see Fig. 8-26) in either TB1-4 (for 20%) or TB1-5 (for 5%) to allow the user to select either of the two settings to accommodate local site conditions. Factory setting is 20% of full intensity.

2.4 REMOTE OPERATION

Switch S1 allows remote ON/OFF operation of the PAPI units from a remote location via TB2-1 and TB2-2. When S1 is in the LOCAL position, 120 V ac is provided (through fuse F2) to switch contacts of K2 which allows the lamps to operate. When S1 is in the REMOTE position, a switch closure must be provided across TB2-1 and TB2-2 to provide 120 V ac to switch contacts of K2 and turn on the PAPI units. See Figure 8-10.

2.5 OPTIONAL HEATER

Thermostat TH1 in the master is used to supply the heater resistors R1 and R2 in the tilt switch boxes with 120 V ac when the outside air temperature drops below 0°F. This prevents the mercury in the tilt switches from freezing. See Figs. 8-22 and 8-23.

2.6 TILT SWITCH OPERATION

The tilt switch circuit is designed so that the tilt switches are a closed circuit as long as they are not inadvertently lowered between 1/4° and 1/2° or raised between 1/2° and 1° with respect to the preset aiming angle. If a tilt switch is moved from proper alignment, relay K2 in the master will open after a nominal 20-sec. time delay, which deactivates relay K1 in all the PAPI units and cuts off the 120 V ac that is supplied to T1, extinguishing the lamps.

2.7 SLAVE OPERATION

Power is provided to the lamps in the slave units via TB1-1 and TB1-2. The normally closed tilt switch in each unit is connected to TB1-4 and TB1-5 in each unit. In the field, these are all wired in series and connected to TB2-3 and TB2-4 of the master unit (shown on external wiring diagram). If the optional heaters are used in the tilt switches, a wire must be connected from TB2-5 (on master unit) to TB1-3 on all the slave units to provide power to the heaters when required. See Figures 8-22 and 8-23.

3. OPERATION

3.1 INTRODUCTION

The operating conditions for the PAPI system are discussed below.

3.2 NORMAL OPERATION

The PAPI system must operate continuously as long as the runway is in service. At night the system may operate at 20 or 5 percent of full intensity (programmed using wire #203 in the master). Daytime operation is at full intensity.

3.3 REGIONS WITH HEAVY SNOWFALL

Units should operate continuously at normal standby brightness even when the runway is not in use. Any snow will thus melt and drain off. When snowfall is expected to bury the units, the location of the units should be marked with sticks or flags (approx. 7 feet high) to prevent damage to the units by snow removal equipment.

3.4 CRITERIA FOR SYSTEM DEACTIVATION

Pending repair and provided it is continually monitored, a unit in which one of the lamps has failed can still be regarded as operational. Should the system show more serious defects, it must be put out of operation.

3.5 LAMP CURRENT LEVEL ADJUSTMENT.

See Fig. 8-26. Transformer T1 in the master converts 120 V ac to 30.3 V ac at 6.6 amps to power the PAPI lamps. If the input voltage is not 120 V ac, transformer T1 has ±10% taps (TB3-2 (-10%) and TB3-4 (+10%)) to allow for correction of high or low input voltage to the transformer. Similarly, the output terminal block TB1 on transformer T1 has 110% (TB1-1) and 97% (TB1-3) taps to allow for adjustment of the output current level to the lamps. To adjust current to lamps:

a. Place a true rms clamp-on ammeter (or equivalent) around wire at TB5-1 or TB5-2.

b. Turn on system to high intensity.

c. Nominal current reading is 6.6 amps AC. If actual current is *greatly* above or below 6.6 A, move wire #228 to either TB3-2 or TB3-4. If actual current is *slightly* above or below 6.6 A, move wire #103 to either TB1-1 or TB1-3.

d. After adjustment is made, check current level on other line on TB5 to insure that it is approximately the same as the adjusted line.

e. For nighttime adjustment, place wire #203 in either TB1-5 (5%) or TB1-4 (20%) position. See Figure 8-26.

4. MAINTENANCE

4.1 INTRODUCTION

In order to reduce maintenance to a minimum, ADB, Inc. has adopted the simplest possible design and has used the best materials and protective treatments. This coupled with the sturdiness of the associated electrical items, simplifies maintenance. Like any other piece of precision equipment, the light unit will give the best results only if handled with great care and well maintained throughout its lifetime.

4.2 LAMP REPLACEMENT

Deenergize circuit and remove the electrical slip-on fitting on burned-out lamp. Swing back the spring-loaded fork and remove lamp from the reflector. A new lamp can be installed by reversing this procedure. Orientate lamp to match index slots in lamp base with index tabs in lampholder (one tab/slot is square, the other tab/slot is circular). Hold lamp in place by placing the forked spring clip over lamp base and locking spring clip in place by latching forked spring clip behind the locking ears located on side of lampholder.

CAUTION

> Wear cotton gloves when handling the lamps. Touching the quartz bulb with bare fingers may seriously shorten lamp life. If the quartz bulb has been touched, wipe it carefully with lens cleaning tissue or similar material moistened with isopropyl alcohol.

It is recommended that a systematic replacement of all lamps be made after a service period of approximately 800 hours at the 100% brightness level. An elapsed-time recorder connected to the constant current regulator may be used to determine the time for replacement.

4.3 OBJECTIVE LENS REPLACEMENT

The objective lenses are precisely positioned in the unit and are not field repairable since the optical center of the lens must be realigned after replacement. Whenever an objective lens is damaged, the PAPI light unit must be returned to the factory for repair and adjustment. Contact ADB, Inc. Sales Department for details.

4.4 POSITIONING OF FILTERS

The filters must be perfectly clean. Use a soft cotton cloth moistened with alcohol to clean filters, and wear cotton gloves when handling filters. Each filter is held in place in the filter holder by two springs. To remove or replace a filter, first remove the two (2) springs using a small pliers. Unclip the lower end of each spring from the hole in the panel and pull upward on the other end of the spring to remove. The filter now can be removed by sliding it upward out of the holder. To reinstall filter, reverse the removal steps. The filter must be installed in holder so that the lower edge (dull edge) of the filter is down. When cleaning filters, make sure each filter is returned to the same filter holder from which it was removed.

4.5 PREVENTIVE MAINTENANCE

Preventive maintenance check for the PAPI shall be performed as listed in Table 4-1.

Table 4-1. Preventive Maintenance Tasks

INTERVAL	MAINTENANCE TASK	ACTION
After initial installation (during first few weeks)	(1) Check elevation angle of units.	(1) Use checking stick. Reset any units out of alignment.
Daily	(1) Check to ensure all lamps are lighted and illuminated evenly.	(1) Replace burned-out lamps. Clean any dirty glassware.
	(2) Check for an apparent evidence of damage to unit.	(2) Repair or replace.
	(3) Check all control equipment for proper operation.	(3) Repair or replace any damaged components.
Weekly (more frequently during rainy season)	(1) Clean outer surface of protective glass.	(1) Use a soft cotton cloth moistened with alcohol.
	(2) Check elevation angle of units.	(2) Use checking stick. Reset any units out of alignment.
Monthly	(1) Inspect housing and closure system, lamps, electrical connections, filters, and protective glass for damage, breakage or warpage.	(1) Repair or replace any damaged parts.
	(2) Clean interior.	(2) Remove any foreign matter. Clean both sides of the protective glass, color filters, lenses and reflectors. Use a soft cotton cloth moistened with alcohol.
	(3) Make sure mounting is rigid.	(3) Tighten any loose hardware, nuts, screws, etc. Realign unit if hardware has loosened.
	(4) Make sure no vegetation obscures the light beams.	(4) Remove vegetation. Use weed killer to prevent any additional growth.
	(5) Make flight check of system, if possible.	(5) Verify units give proper approach path indication.

5. TROUBLESHOOTING

5.1 TROUBLESHOOTING TABLE

The troubleshooting guide for the PAPI light unit is given in Table 5-1.

Table 5-1. Troubleshooting Guide

Problem: All lamps are out	
Possible Cause	**Solution**
Tilt switch	Realign unit. Jumper tilt switch at master TB2-3 to TB2-4 to check if defective.
Power input	Repair or replace loose or broken wire.
All lamps have failed	Replace lamps. Check input current level.
No input voltage or master has failed	Insure master has correct input voltage. Check for presence of master output current. Troubleshoot master if none present.
Problem: Lamp(s) are dim	
Possible Cause	**Solution**
Dirty lens shield	Clean with soft cotton cloth moistened with alcohol.
Lamp not properly seated in reflector	Re-seat lamp in reflector. Replace lamp socket, if necessary.
Input voltage to master is too low	Correct.
Current level is too low	Check with ammeter. Troubleshoot master or check wiring if adjustment of taps doesn't solve problem.
Lens is improperly aligned	Replace lens if loose in ring.
Unit improperly aligned	Use check stick to check alignment
Problem: Short lamp life	
Possible Cause	**Solution**
Current level is too high	Check input current level.
Input voltage to master is too high	Correct.
Output of master is too high	Troubleshoot master.
Problem: Tilt switch circuitry stays tilted	
Possible Cause	**Solution**
Tilt switches incorrectly wired	Correct wiring
Noise voltage present on tilt switch wires	Use a voltmeter and measure voltage between neutral and tilt switch return (TB5-6 to TB2-4) in master (see Fig. 8-22) and also in slave (TB1-2 to TB1-4) most distant from master (see Fig. 8-22 or 8-23) with all tilt switches tilted. If greater than 10 V ac, tilt switch wiring must be corrected or replaced. If this is not possible, contact ADB Sales Department.

6. PARTS LIST

6.1 PARTS LIST

Table 6-1 provides data on all replaceable parts for each repairable or replaceable component or assembly for the Style A PAPI.

NOTE

Substitution of electrical components may be done only if substitution is the exact physical equivalent (body or case size) and equal, or better electrical characteristics with respect to tolerance, failure rate and/or reliability.

Table 6-1. Parts List

Item # Fig. 8-9	Description: 44C1408-X Master Box Assembly	Mfrs. Part Number	ADB Part No.
3	Photocell		48A0089
4	Photocell Socket		49A0095
6	Frangible Coupling		62B0064
7	Base Flange		62B0107-2
12	L-880 Panel Assembly		44C1413-1
12	L-881 Panel Assembly		44C1413-2

Item # Fig. 8-10	Description: 44C1413-X Master Panel Assembly	Mfrs. Part Number	ADB Part No.
22	Fuse, 0.1A, SLO-BLO	Buss MDL 1/10A	47A0068
23	Fuse, 0.5A, SLO-BLO	Buss MSL 1/2A, 250 V	47A0119
24	Fuse, 30A, SLO-BLO	Reliance MEN 30	47A0024
27	Varistor	GE V150HE150	32A0011
28	Switch, DPDT	Cutler Hammer FH-223	45A0268
29	Transformer	Triad F-211Z	35B0142
30	Contactor	Telemechanique LC1-D123	53A0198
32	Relay, 120VAC	Potter & Brum. K10P11A15-120VAC	53A0183
33	Relay, 24VAC, DPDT	Potter & Brum. KUP11A15-24VAC	53A0270
35	Time Delay Relay	Deltrol 30226-84	53A0186
36	Contactor	Telemechanique LC1-D408K	53A0199
38	Thermostat	Therm-O-Disc 37T21	54A0007
39	Transf. (L-880)		35B0208
39	Transf. (L-881)		35B0214
42	Circuit Breaker, 30A	Potter & Brum. W67X2Q1-2-30	57A0029

Table 6-1. Parts List

Item # Fig. 8-8	Description: 44C1417-X Slave Final Assembly	Mfrs. Part Number	ADB Part No.
1	Light Box Assembly		44C0937
2	Adjustable Leg Assembly (old style see Fig. 8-6.1)		44C0909
2	Adjustable Leg Assembly (new style see Fig. 8-6)		44C2362
4	Base Flange		62B0107-2
8	Coupling	Neer TC616	77A0009
10	Lamp, 200W/6.6A	Osram 64382	48A0077
13	Tilt Switch Assembly (Class I, -35°C)		44C1267-2
13	Tilt Switch Assembly (Class II, -55°C)		44C1267-1
20	L-823 Cordset		73A0009-31
23	Cable Connector		77A0073

Item # Fig. 8-5	Description: Optical Assembly	Mfrs. Part Number	ADB Part No.
2	Protective Glass		63A0360
	Gasket (for item 2)		63A0359
4	Lens in ring (factory installation only)		44B1039
6	Filter, Red		63A0356
8	Reflector		61B0128
	Aiming Device Kit (includes aiming device, level, checking stick)		44A0933

See Fig. 8-6	Description: New Style Adjustable Leg* (44C2362)	Mfrs. Part Number	ADB Part No.
	Threaded Rod, 3/8 -16 x 6"		64A0210
	Threaded Rod, 1/2 - 13 x 5"		64A0211
	Hex Nut, 3/8 - 16		65A0015-29
	Flat Washer, 3/8		66A0015-31
	Differential		85B0057
	Split Lock Washer, 3/8		66A0026-29
	Hex Nut, 1/2 - 13		65A0015-33
	Leg, Cap		61A0111

*See Fig. 8-6.1 for old style adjustable leg (used on units shipped prior to April 1991) part numbers.

Table 6-1. Parts List

See Figs. 8-24/8-25	Description: 94A0017-1 L-880 Field Splice Kit	Quantity	ADB Part No.
	Frangible Coupling	12	62B0499
	2-Pole Female Plug (91R-E-8)	12	70A0048
	Retaining Flatwasher 5/8" ID x 1 1/2" OD	12	66A0015-37

See Figs. 8-24/8-25	Description: 94A0017-2 L-881 Field Splice Kit	Quantity	ADB Part No.
	Frangible Coupling	6	62B0499
	2-Pole Female Plug (91R-E-8)	6	70A0048
	Retaining Flatwasher 5/8" ID x 1 1/2" OD	6	66A0015-37

Table 6-2. Recommended Spare Parts

Description	ADB Part No.
Photocell	48A0089
Fuse, 0.1A, SLO-BLO	47A0068
Fuse, 0.5A, SLO-BLO	47A0119
Fuse, 30A, SLO-BLO	47A0024
Lamp, 200W, 6.6A	48A0077
Relay, 120 VAC, 60 Hz	53A0183
Relay, 24 VAC, DPDT	53A0270
Relay, Time Delay	53A0186
Varistor	32A0011
Tilt Switch Assembly (Class I, -35°C)	44C1267-2
Tilt Switch Assembly (Class II, -55°C)	44C1267-1

7. INSTALLATION

7.1 INTRODUCTION

This section provides instructions for the installation of the PAPI system. Refer to the airport project plans and specifications for the specific installation instructions.

7.2 UNPACKING

The equipment must be handled very carefully to prevent component damage. Unpack carton upon receipt and check the contents and their condition. Note any exterior damage to the carton which might lead to detection of equipment damage.

7.2.1 Damage

If damage to any part of the equipment is noted, a claim form should be filed with the carrier immediately. Inspection of equipment by the carrier may be necessary.

7.3 SITING CONSIDERATIONS

When viewed from the approach end, the PAPI system shall be located on the left-hand side of the runway as shown in Figs. 8-2 and 8-3. The PAPI may be located on the right side of the runway if siting problems exist, such as conflicts with runways or taxiways. The PAPI must be sited and aimed so that it defines an approach path with adequate clearance over obstacles and a minimum threshold crossing height. If the runway has an established ILS glideslope, the PAPI is installed as described in Section 7.4 so that the visual glideslope will coincide (as much as possible) with the electronic glideslope. If there is no ILS on the runway, the PAPI's glideslope must be chosen as described in Section 7.5 to ensure the on-course signal of the PAPI will provide adequate clearance over obstacles.

7.3.1 Distance of PAPI Units from Runway Edge

See Fig. 8-3. The light unit nearest to the runway shall be no closer than 50 feet (+10, -0 ft.) from the runway edge or to other runways or taxiways. This distance may be reduced to 30 feet for small general aviation runways used by non-jet aircraft.

7.3.2 Lateral Spacing of PAPI Units

The PAPI units shall have a spacing between units of 20 to 30 feet. The distance between boxes shall not vary by more than 1 foot.

7.4 SITING PAPI WITH ILS GLIDESLOPE

When a runway has an established ILS electronic glideslope, the PAPI on-slope signal should coincide, as much as possible, with that for the ILS. To accomplish this, the PAPI is placed at the same distance (tolerance of ±30 feet) from the threshold as the virtual source of the ILS glideslope and aimed at the same angle as the ILS glideslope. This procedure must be modified for runways that serve aircraft in height group 4 (see Table 7-1) because of the eye-to-antenna distance. For these runways, the distance of the PAPI from the threshold shall equal the distance to the virtual source of the ILS glideslope plus an additional 300 feet (+50 ft., -0 ft.). Calculations should be performed to ensure that the site chosen provides adequate obstacle clearance and threshold crossing height.

Table 7-1. Threshold Crossing Height

Type of Aircraft	Cockpit-to-Wheel Height	Visual Threshold Crossing Height	Remarks
Height Group 1 (General aviation, small commuters, corporate turbojets)	10 feet or less	40 feet (+5 ft., -20 ft.)	Many runways less than 6,000 ft. long with reduced widths and/or restricted weight bearing which would normally prohibit landings by larger aircraft
Height Group 2 (F-28, CV-340/440/580, B-737, DC-8/9)	15 feet	45 feet (+5 ft., -20 ft.)	Regional airport with limited air carrier service
Height Group 3 (B-707/720/727/757)	20 feet	50 feet (+5 ft., -15 ft.)	Primary runways not normally used by aircraft with ILS glideslope-to-wheel heights exceeding 20 ft.
Height Group 4 (B-747/767, L-1011, DC-10, A-300)	Over 25 feet	75 feet (+5 ft., -15 ft.)	Most primary runways at major airports.

7.5 SITING PAPI ON RUNWAYS WITHOUT AN ILS

When the runway doesn't have an ILS glideslope, the PAPI must be sited and aimed so that it defines an approach path which will produce the required threshold crossing height and clearance over any obstacles in the approach area.

7.5.1 Threshold Crossing Height (TCH)

The TCH is the height of the lowest on-course signal at a point directly above the threshold and the runway centerline. The minimum allowable TCH depends on the height group of the aircraft using the runway, and is shown in Table 7-1. The glideslope of the PAPI must provide the proper TCH for the most demanding aircraft height group using the runway. See Fig. 8-3.

7.5.2 Glideslope Angle

The standard visual glideslope angle for the PAPI is 3 degrees. For non-jet runways, this may be raised to 4 degrees if required to provide obstacle clearance.

7.5.3 Distance of PAPI from Threshold

The following method can be used to determine the PAPI installation distance from the runway threshold provided there are no obstacles in the area from which the PAPI signals can be observed, no differences in elevation between the threshold and the installation zone of the PAPI or between the units, or reduced length of runway. The distance of the PAPI units from the threshold (D1) can be calculated from the equation:

$$D1 = TCH \times \text{cotan (angle of lowest on-course signal)}$$

where the TCH is the threshold crossing height for the most demanding aircraft using the runway (see Table 7-1). The angle of the lowest on-course signal is determined as follows:

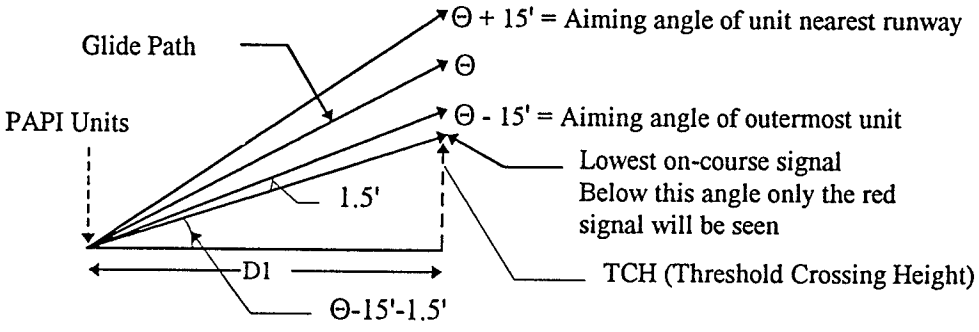
a. For the L-880 PAPI system the angle of the lowest on-course signal will be the aiming angle of the third light unit from the runway minus 1.5 minutes or arc. See note below.

b. For the L-881 PAPI system this angle will be the aiming angle of the outside light unit minus 1.5 minutes of arc.

☑ **Note:** The subtraction of 1.5 minutes of arc takes into account the width of the transition sector (3 minutes of arc) between the white and red part of the PAPI light beam. The lowest possible on-course signal is 3'/2 = 1.5' lower than the aiming angle.

7.5.4 Obstacle Clearance Surface

The PAPI must be positioned and aimed so that there is no risk of an obstruction being located in an area where the PAPI signals can be observed. A survey of the site must be made to determine if an obstacle is present in the area where the PAPI signals can be observed. This obstacle clearance surface begins 300 feet in front of the PAPI units (closer to the threshold) and proceeds outward into the approach area at an angle of 1 degree less than the lowest on-course signal. This surface extends 10° on either side of the runway centerline to a distance of 4 miles from the point of origin. If an obstruction penetrates the obstacle clearance surface and cannot be removed, then the glideslope angle must be re-aimed or the PAPI system moved further from the threshold. By moving or re-aiming the PAPI, the obstacle clearance surface must be repositioned so that it will not be penetrated by an obstruction. See Fig. 8-3.



D1 = Distance of PAPI units from threshold

The 1.5' is one-half the width of the transition sector of the light beam. The transition between the white to red part of the beam is 3 minutes of arc (3'), hence the additional 1.5' must be taken into account in calculating D1.

For L-881: D1 = TCH x cotan (Θ - 15' - 1.5')

☑ **Note:** For the L-880 PAPI system, the lowest on-course signal will be the aiming angle of the third light unit from the runway minus 1.5'. For a standard L-880 installation the lowest on-course signal will be Θ -10' - 1.5'. For Height Group 4 aircraft this angle will be Θ - 15' - 1.5'.

For L-880 (Standard Installation): D1 = TCH x cotan (Θ - 10' - 1.5')
For L-880 (Ht. Group 4 aircraft): D1 = TCH x cotan (Θ - 15' - 1.5')

7.5.4.1 Reduction of Beam Coverage for Obstacle Avoidance

A PAPI system may require a reduction of the horizontal beam coverage because of an obstacle in the approach area. If this is the case, special consideration should be given to the following factors when determining the required system cutoff angle(s):

1. Type and location of the obstacle with respect to the area where the PAPI signals can be observed
2. Wingspan of aircraft using the runway
3. Vertical pitch of the glideslope
4. Installation tolerances
5. Position of the PAPI system
6. Additional safety considerations
7. Manufacturing tolerances are +0.0° to -0.4°
8. The origin of the cutoff angle should be either the outermost or innermost unit (whichever is closest in azimuth to the obstacle)
9. Cutoff angles should be FAA approved

When ordering a PAPI system with a reduced horizontal beam coverage from ADB, the following information is required:

1. Number of systems required
2. Type of system--L-880 or L-881; Style A or Style B
3. Required cutoff angle (from pilot's viewpoint and tolerance*)
4. Left/right cutoff (from pilot's viewpoint when landing)

*For example, if the nominal required cutoff is 7°, the cutoff angle which would be ordered is 7.2° (+0.0°, -0.4°). The additional 0.2° is added to the nominal value because it is the midpoint of the manufacturing tolerance (+0.0°, -0.4°). The sales order would say, for example, cutoff = 7° Right (from pilot's viewpoint).

7.6 SITING TOLERANCES

7.6.1 Azimuthal Aiming

Each light unit shall be aimed outward into the approach zone on a line parallel to the runway centerline within a tolerance of ±1/2°.

7.6.2 Mounting Height Tolerance

The beam centers of all light units shall be within ±1 inch of a horizontal plane. This plane shall be within ±1 foot of the elevation of the runway centerline at the intercept point of the visual approach angle with the runway except for the condition in Section 7.7.

7.6.3 PAPI Tolerance Along Line Perpendicular to Runway.

The front face of each light unit in a bar shall be located on a line perpendicular to the runway centerline within ±6 inches.

7.6.4 Correction for Runway Longitudinal Gradient

See AC 150/5435-28D. On runways where there is a difference in elevation between the runway threshold and the elevation of the runway centerline adjacent to the PAPI, the location of the light units may need to be adjusted with respect to the threshold in order to meet the required obstacle clearance and TCH. If the condition exists, the following steps should be taken to compute the change in the distance from the threshold required to preserve the proper geometry. See Figure 8-4.

a. Obtain the runway longitudinal gradient. This can be done by survey or obtained from airport obstruction charts or "as-built" drawings.

b. Determine the ideal (zero gradient) distance from the threshold in accordance with the preceding instructions.

c. Assume a level reference plane at the runway threshold elevation. Plot the location determined in (b) above.

d. Plot the runway longitudinal gradient.

e. Project the visual glideslope angle to its intersection with the runway longitudinal gradient. Then solve for the adjusted distance from the threshold (Section 7.6.2) either mathematically or graphically.

f. Verify the calculated location gives the desired threshold crossing height.

7.7 ADDITIONAL SITING CONSIDERATIONS

a. Where the terrain drops off rapidly near the approach threshold and severe turbulence is experienced, the PAPI should be located farther from the threshold to keep the aircraft at the maximum possible threshold crossing height.

b. On short runways, the PAPI should be as near the threshold as possible to provide the maximum amount of runway for braking after landing.

c. At locations where snow is likely to obscure the light beams, the light units may be installed up to a maximum height of 6 feet above ground level. This may require installing the light units farther from the runway edge to ensure adequate clearance for the most critical aircraft. Since increasing the height of the light units also increases the threshold crossing height of the visual glideslope, the lights may also have to be relocated closer to the threshold to remain within the specified tolerance. See Figure 8-27.

d. Since the effectiveness of the PAPI system is dependent on the optical red and/or white signal pattern from the light units, make sure that no other lights are close enough to confuse the pilot.

7.8 PAPI FOUNDATIONS

The PAPI units shall be installed on concrete pads at ground level with frangible couplings. The foundation should extend at least 12 inches below the frost line and at least 1 foot beyond the light unit to minimize damage from mowers. Figure 8-15 shows dimensions which are generally acceptable for the concrete pad. The steps below should be followed in casting the concrete pad and anchoring the support fixtures.

a. Stake out the longitudinal axis of the light units parallel to the runway centerline. See Figs. 8-2 and 8-3 and Sections 7.3.1 and 7.3.2 for spacing between units.

b. Dig the foundation hole per Figure 8-15.

c. Place foam in pit to absorb frost heave below the central part of the slab. Place L-867 light base/conduit elbows or pipes for cables. Place bars for reinforcement of concrete.

d. Pour in concrete and allow it to harden for at least one day.

e. After concrete sets up, using chalk draw a longitudinal axis (in accordance with the axis staked out on the ground) on the upper surface of the pad. Draw a transverse axis perpendicular to the other axis.

f. Lay a positioning plate (see Figure 8-17) on the pad; center it by positioning the central hole at the intersection of both axes; align the plate along the longitudinal axis using the V-notches in the plate.

g. Mark the 8 locations of the screws on the slab; drill the 8 holes to the diameter and depth required for the expansion sleeves and insert the sleeves.

h. Place and fasten the flanges with two screws.

i. Install the frangible couplings (see Figure 8-7).

☑ **Note**: Instead of expansion sleeves, 3/8 - 16 x 6-inch anchor j-bolts can be cast into the concrete at the proper locations on a 4 3/4" diameter bolt circle, two places.

7.9 PAPI AIMING ANGLES

The aiming angles for the L-880 and L-881 PAPI light units are given in Table 7-2.

Table 7-2. Aiming Angles for PAPI Units.

L-880 (4 box) PAPI	Aiming Angle (minutes of arc) (standard installation)	Aiming Angle (minutes of arc) (Height Group 4 aircraft* on runway with ILS)
Unit nearest runway	30' above glide path	35' above glide path
Next adjacent unit	10' above glide path	15' above glide path
Next adjacent unit	10' below glide path	15' below glide path
Next adjacent unit	30' below glide path	35' below glide path

L-881 (2 box) PAPI	Aiming Angle (minutes of arc) (standard installation)
Unit nearest runway	15' above glide path
Unit farthest from runway	15' below glide path

*See Table 7-1.

☑ **Note**: 60 minutes of arc = one degree (60' = 1°)

7.10 ASSEMBLING ADJUSTABLE LEGS

Assemble the legs for each PAPI unit as follows:

a. Screw threaded rods into differentials (item 6, Fig. 8-6) and assemble legs per Figure 8-6. Do not assemble upper hex nut (item 15), lockwasher (item 14) and flatwasher (item 13). These items will be installed after the PAPI unit is mounted on the legs.

b. Screw front and rear leg assemblies into the frangible couplings installed on concrete pad.

7.11 MOUNTING UNIT

See Figures 8-6 and 8-18.

a. Gently mount PAPI unit on the four legs so that the unit rests on the top of the lower flatwasher (12), lockwasher (11) and hex nut (10).

b. Install the upper flatwashers (13), lockwashers (14) and hex nuts (15) on the threaded rods. Do not tighten nuts.

c. Make sure the bottom of the unit is resting on the top of the lower flatwasher (12) of the right front leg F.

d. Make sure all locking nuts on the frangible couplings are tightened.

7.12 ALIGNMENT OF UNITS

7.12.1 Using Aiming Device

The aiming device (see Fig. 8-11) has two graduated scales, a large metallic scale and a plastic scale (on the upper arm of the aiming device) which are used to set the aiming angle.

The ***metallic scale*** is calibrated in ***10 minutes of arc*** from 0° to 10°. Since there are 60 minutes of arc in one degree (60'= 1° or 30'= 1/2°), there are 6 divisions (0'-10', 10'-20', 20'-30', 30'-40', 40'-50', 50'-60') between each degree tic mark on the scale. Note the 30 minute or 1/2 degree tic mark between each degree tic mark (0° to 1°, 1° to 2°,..., 9° to 10°) on the metallic scale is slightly longer than the 10', 20' or 40' and 50' tic marks.

The ***plastic scale*** is calibrated in ***minutes of arc*** from 0 to 10 minutes. If an angular setting of, for example, 3° 30' is desired, the setting on the aiming device is obtained by moving the upper bar of the aiming device with the attached plastic graduate scale so that the *0 line on the plastic scale lines up exactly with the 3° 30' tic mark on the metallic scale* (the 30 minute (30') tic mark is midway between the 3° and 4° tic marks). After obtaining this setting, tighten the locking screw on the upper arm to secure the angular setting.

Suppose now that an angle of 3° 35' is desired. To obtain this setting, first set the 0 line on the plastic scale at the 3° 30' tic mark as described above. Then locate the 5 minute line on the plastic scale. It will not be lined up with any of the tic marks on the metallic scale. To obtain the desired setting of 3° 35', slowly move the 5 minute line upward until it lines up exactly with the **next tic mark** on the metallic scale. The 5 minute line on the plastic scale will be exactly lined up with the 4° 20' tic mark on the metallic scale when the aiming device is set for 3° 35'. (Note: The 0° line on the bottom of the plastic scale will be centered between 3° 30' tic mark and 3° 40' tic mark on the metallic scale.) Tighten the locking screw on the upper arm to secure the arm's angular setting.

Practice using the aiming device to obtain the following angular settings: 3° 33' and 3° 38'.

☑ **Note**: The 3° 33' angular setting is obtained when the 3 minute line on the plastic scale is lined up with the 4° tic mark on the metallic scale; the 3° 38' angular setting is obtained when the 8 minute line on the plastic scale is lined up with the 4° 50' tic mark on the metallic scale.

7.12.2 Preliminary Remarks

The following remarks should be kept in mind in all the operations described below.

a. When handling the unit and, in particular, during installation and aiming, avoid movement of the reference adjusting screws in blocks A and B.

☑ **Note**: Any accidental movement of these screws will require resetting in the factory by specialized personnel.

b. When placing the aiming device on the PAPI unit, make sure the holes and slots in the movable arms of the aiming device are properly inserted over the screw heads in the reference blocks (A and B) and into reference slots (C and D).

c. The bubble level should be carefully positioned between the locator screws on the bar of the aiming device or against the locator screws on the movable arms.

d. When working with the fastening nuts and locknuts on the legs, make sure that the threaded rod does not rotate.

7.12.3 Horizontal Aiming

Horizontal cut-offs are aligned to the aiming device, not the PAPI box. See Figure 8-18, Step 1. Set the aiming device (see Sect. 1.6.1) at the required aiming angle for the unit. Open up the two movable arms and place instrument on the reference blocks A, B, and slots C and D with graduated scale near reference slot C. Carry out the following aiming procedure:

a. Place rod at 164 feet in front of the PAPI unit at the same distance from the runway centerline as reference block B and slot C.

b. Check the alignment through the V-sites (use sighting picture given in Figure 8-11) on bar of aiming device. If necessary, adjust alignment of unit by a small movement of the lower hex nuts (item 10, Fig. 8-6).

c. Tighten upper hex nut (15) on the right front leg F.

d. Do not tighten lower hex nut (10). Leg F will be the pivot during the following operations.

7.12.4 Rough Elevation Setting

☑ **Note**: If the legs of the unit are installed at the same height and are level, the unit will be aimed at approximately 3 degrees.

a. See Step 2, Figure 8-18. Place the bubble level between locator screws on the movable arm resting on reference blocks A and B. Level by adjusting the hex nuts (10) and (15) on the left front leg E (see Figure 8-6). Next tighten nuts (15) and (10) simultaneously.

b. See Step 3, Figure 8-18. Place level between locator screws on the bar of the aiming device resting on reference block B and slot C. Level by adjusting hex nut (10) of the right rear leg G. During this operation, the rigid bottom of the unit must be free from hex nut (10) on the left rear leg H. Position upper hex nut (15) on leg G against upper flatwasher. Simultaneously tighten hex nuts (10) and (15) on leg G.

c. See Step 4, Figure 8-18. Place level between locator screws on the movable arm resting on reference slots C and D. Level by adjusting hex nut (10) on the left rear leg H. Some adjustment of the upper hex nut (15) may also be required. Position hex nut (15) on leg H against upper flatwasher. Simultaneously tighten hex nuts (10) and (15).

d. Tighten lower hex nut (10) on leg F.

This completes the *coarse setting* of the unit; and no further adjustment will be required on the hex nuts (10 & 15).

7.12.5 Checking Horizontal Aiming

Make sure rod at 164 feet from the unit is still properly aligned with the V-sites on aiming bar. If not, loosen all upper hex nuts (15). Align the unit (see Section 7.12.3) and repeat the operations in the preceding section.

☑ **Note**: It is not necessary for the alignment to be absolutely perfect. An error of 20 inches at 164 feet yields an error of 0.5°, which is within tolerance (see Section 7.6.1).

7.12.6 Fine Elevation Setting

Fine elevation adjustment and any subsequent adjustment will require the following steps using the differential (Item 6, Figure 8-6).

a. Place aiming device on unit so that it rests on the screws of reference blocks A and B, and slots C and D.

b. Make sure the locking hex nuts (Items 4 & 8, Figure 8-6) for differential on right front leg F are tightened. The locking hex nuts for the differentials on the other legs have to remain loose.

c. See Figure 8-18, Step 2. Place level on the arm of the aiming device resting on reference blocks A and B. Level by turning differential on left front leg E in the proper direction. Tighten locking hex nuts on the differential on leg E when leveled.

d. See Figure 8-18, Step 3. Place bubble level on bar of aiming device resting on reference block B and slot C. Proceed with the leveling procedure by adjusting the differential on rear legs G and H, turning both differentials in the same direction with equal amplitude. Tighten locking hex nuts on differential on leg G when leveling completed.

e. See Figure 8-18, Step 4. Place level on movable arm resting on slots C and D. Level by turning differential of left rear leg H in the appropriate direction. Tighten locking hex nuts on differential on leg H when leveling is completed.

f. Repeat the above fine elevation adjustment steps (b-e). If setting is still not correct, go back and repeat the rough elevation adjustment steps and then the fine adjustment steps until the correct setting is obtained.

7.13 TILT SWITCH INSTALLATION

The tilt switches for the PAPI units are packaged separately for shipment and must be installed on the units as shown in Figure 8-8. The tilt switch must be installed on the rear of the PAPI unit (on the outside) so that the two black arrows on the tilt switch label are pointing upward. Two bolts, lockwashers, hex nuts, and flatwashers are supplied (Items 15, 16, 17 and 19, in Figure 8-8) for installation. Perform the following steps to install the tilt switch:

☑ **Note**: It is important that the tilt switch wires be free from nicks and routed in such a manner as to minimize conducted interference between adjacent wires.

1. Place the bracket with the tilt switch over the two holes on the left rear of the unit (on the outside near leg H, see Fig. 8-18). The bracket is in the correct position if the black arrows on the tilt switch label are pointing upward.

2. Install bolt (Item 15, Fig. 8-8) through flatwasher (Item 19, Fig. 8-8) and then through tilt switch bracket (Item 14) and through one of the two holes on the PAPI frame, and place lockwasher (Item 16) and nut (Item 17) on the bolt. Do not tighten completely. Install the other bolt through the second hole of the tilt switch bracket and tighten both bolts so that the bracket is secure against the PAPI frame.

3. Route tilt switch wire through watertight cable connector as shown in Fig. 8-8, and make connections to TB1 as indicated in Figs. 8-20 to 8-21 (schematic/wire diagrams). The tilt switch is now installed and next must be leveled.

7.13.1 Leveling Tilt Switch

Place a precision bubble level on top of the tilt switch (with metal plate attached to hold level). Loosen bolts and adjust the up/down position of the tilt switch until level reads true. Tighten the locking bolts. Use a precision level such as the ±0.004 in/ft degree of precision level used for leveling the PAPI units.

7.14 MASTER BOX ASSEMBLY INSTALLATION

See Figures 8-22, 8-23 and 8-26.

7.14.1 Location of Master Box.

The master should be located behind the slave unit #1 (unit most distant from runway) from 0 to 100 feet from the light unit. It should be located so that stray light from taxiing aircraft, rotating beacons, and automobiles does not energize the photocell on the unit.

7.14.2 Foundation.

Dig, frame and pour the foundation for the master per Figure 8-16. Install (2) two-inch 90° conduit elbows with couplings in the trench prior to pouring the concrete. After the concrete has hardened, install frangible couplings in the two couplings on the concrete pad. Set master unit on the frangible couplings and secure in place using the locking screws on the slipfitters (bottom of the master unit). Ground the master unit using AWG #12 ground wire as shown in Figures 8-22 and 8-23, use external wiring diagram (see Figs.

8-22 and 8-23) to attach the appropriate field wiring to the labeled terminals of the master. See Figure 8-26 for schematic of master. See Section 7.19 for installation of the optional Interlock Relay and connection to series circuit.

7.15 SLAVE UNIT WIRING

See Figures 8-22 to 8-25. All installation wiring should conform to the applicable sections of the National Electrical Code and local codes. Each slave unit has three L-823 cordsets hanging from the rear of the unit. The wires can be routed to an L-867 Style D light base installed in or near the pad behind the PAPI unit. The L-867 base should not be underneath the PAPI unit. An alternate method is to route each L-823 cordset to a separate conduit elbow installed in the pad as shown in Figure 8-25. Use external wiring diagrams given in Figure 8-22 (for L-880 systems) or Figure 8-23 (for L-881 systems) to attach the appropriate wiring between the master and slave units.

Each slave unit must be grounded as shown in Figure 8-8. An AWG #12 (min.) ground wire must be connected to the ground lug on the floor flange on the rear leg.

After wiring connections have been made and the operation of the units has been checked out, install duct seal or RTV in all conduit entrances.

7.16 CHECKING SLOPE ANGLES OF PAPI UNITS

It may be requested that when the equipment is put initially into operation and at regular intervals thereafter, the cut-off angle of the units be checked. To make this measurement, it will be necessary to use a surveying instrument or a bubble level with telescope and a surveyor's stake. The procedure (see Fig. 8-19) is as follows:

a. Place the surveying instrument 6 to 10 feet behind the unit pointing down beam.

b. A surveyor's stake is held by an assistant approximately 16 feet in front of the unit.

c. Take reading "A" for the intersection of the horizontal of the telescope with the stake.

d. Take reading "B" for the intersection of the cut-off plane of the light beam with the surveyor's stake.

e. The assistant should now move a precisely measured distance of about 50 to 66 feet (±0.25%) down beam and take the same measurements A' and B', as in (c) and (d) above.

f. The angle "x" of the beam cut-off to the horizontal is found from:

$$\tan x = (\overline{A'B'} - \overline{AB}) / D$$

☑ **Note:** the overline ($\overline{\ }$) denotes length

where D is the horizontal distance between the two stake positions (see Fig. 8-19). If similar checks are to be scheduled in the future, a small concrete pad holding a galvanized pipe may be installed in front of each unit at the distances used above.

7.17 REFERENCE BASES FOR CHECKING STICK

See Figure 8-12. As soon as the system is found to be operationally acceptable in all respects, permanent sighting bases should be installed in front of each light unit to allow for routine checks of the elevation setting using the checking stick.

7.17.1 Locating Reference Bases

a. A concrete sighting base should be located on the extended centerline of each unit.

b. When the PAPI is switched on, walk along the centerline of the unit observing it from time to time through the screen on the checking stick until the lower limit of the white sector is about to disappear under the lower scored line.

c. At this point, dig a hole approximately 16 inches square and 12 inches deep. Drive a steel pipe (see Fig. 8-12) vertically in the center of the hole until its top is at ground level. Place the bottom end of the checking stick on top of the pipe and observe the light unit through the screen. Gradually drive the pipe into the hole, while frequently observing the light unit through the screen, until the light beam no longer appears completely white just below the upper line of the screen. Repeat this procedure for the other units, using the same observer.

7.17.2 Observations with Checking Stick

See Fig. 8-12. Place the checking stick on concrete sighting base (see Section 7.17) in front of the light unit and switch the PAPI system on. Observe the light unit through the screen. Just below the upper line of the screen, the light beam should no longer appear completely white. If this is not the case, the unit is out of alignment and requires resetting (see Section 7.12).

7.18 Flight Check for Reduced Horizontal Coverage

A flight check is required for the PAPI system when there is reduced horizontal coverage to determine if all horizontal cutoffs of the PAPI beams are properly located relative to any obstacles. If horizontal realignment is required, the upper an lower locknuts on all PAPI legs must be loosened and the unit realigned as indicated in Section 7.12.3.

7.19 OPTIONAL PAPI INTERLOCK RELAY

The optional interlock relay provides an automatic operational control of the PAPI during hours of darkness preventing the PAPI system from being energized unless the runway lights are on. Daytime operation of the PAPI system is not affected by the interlock relay. When the interlock relay senses current in the runway circuit during hours of darkness, the normally open contacts of the relay are closed, causing

the PAPI system to energize. When the runway lights are turned off at night, the interlock relay contacts are opened and the PAPI system is deenergized. Thus, during nighttime hours the PAPI system is on only when the runway lights are on and off when the runway lights are off.

7.19.1 INSTALLATION

The interlock relay is installed in the L-880 (or L-881) PAPI Type A master cabinet. The only additional wiring required is the connection of an L-830 isolation transformer in the runway lighting loop and the connection of the secondary lead of the transformer to terminal block TB2-7 and TB2-8 in the master cabinet.

If the runway loop is 6.6 A, use an L-830-1 (30/45W, 6.6A/6.6A) transformer, while if the loop is 20 A, an L-830-2 (30/45W, 20A/6.6A) transformer is required. The transformer may be installed in an L-867 base located near the runway lighting loop with the secondary lead from the transformer run through conduit using (customer supplied) extension cable to the master cabinet. See PAPI interlock schematic, Figure 8-28.

7.19.2 OPERATIONAL CHECK

WARNING: Power is on in the master cabinet when the runway lights are off.

After the system has been installed, place a cover over the photocell on the master cabinet to simulate nighttime conditions, and turn the constant current regulator which powers the runway lighting loop to the lowest brightness level, i.e., B10 for a 3-step CCR or B1 for a 5-step CCR. The PAPI system should turn on. If the PAPI lights do not turn on, the current set point of the interlock relay's current sensor may need adjustment.

7.19.3 Adjustment of Interlock Relay Current Set Point

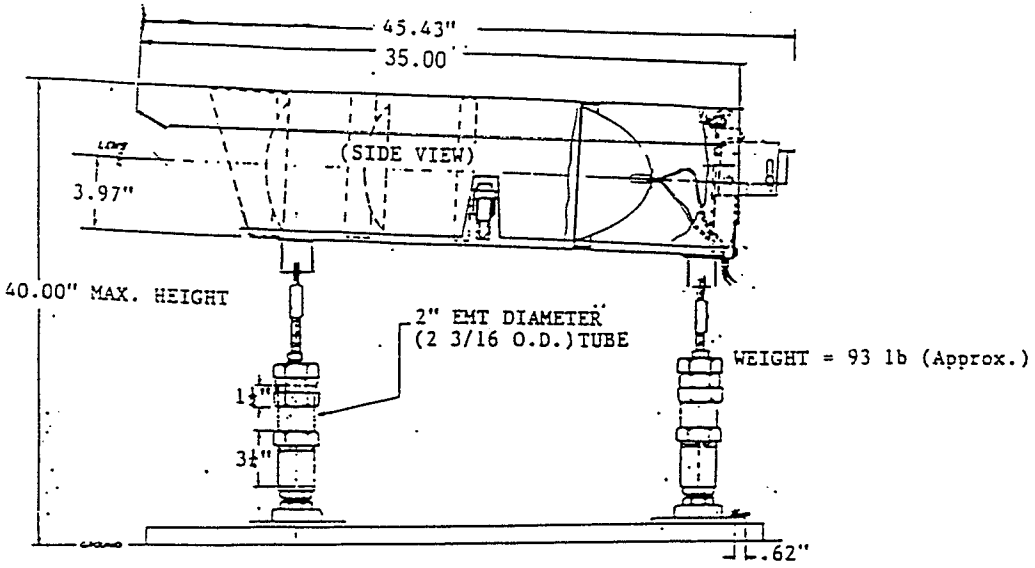
The interlock relay contains a current sensing board which is preset at the factory to energize the PAPI system when the current level in the runway lighting loop is at the lowest level. To adjust the current level set point for the interlock relay, the following procedure should be followed.

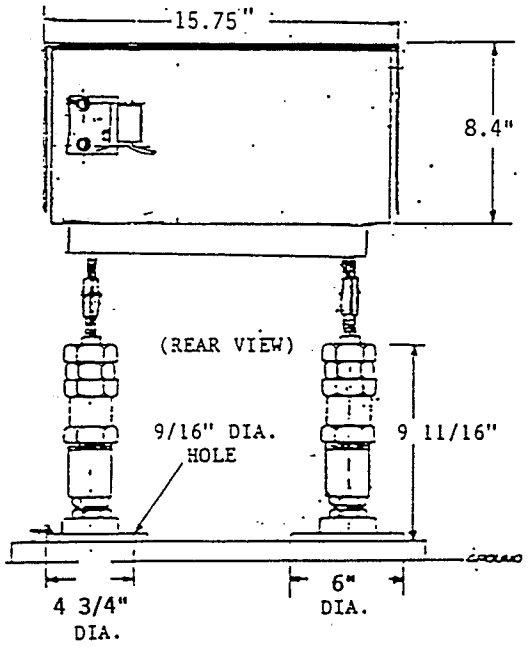
1. Energize the runway lighting circuit at the lowest intensity level. Place a cover over the photocell on the master cabinet to simulate nighttime conditions.

2. Turn the potentiometer R9, located on the interlock relay's current sensor in the master cabinet (see Figure 8-28), all the way counterclockwise and then clockwise until the PAPI lights turn on. Then turn potentiometer R9 clockwise one additional turn.

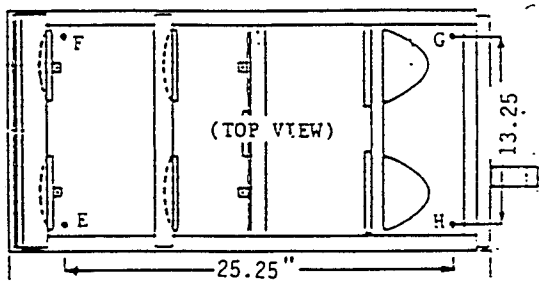
3. Leaving the photocell covered to simulate nighttime conditions, verify that the PAPI lights turn on when the runway lights are energized at the lowest current level and that the PAPI lights deenergize when the runway lights turn off.

4. After operation of interlock relay has been verified, remove cover from photocell on master cabinet.





Style A (Voltage Powered) PAPI
and Master Box Assembly



E,F,G,H -- Adjustable Leg Positions

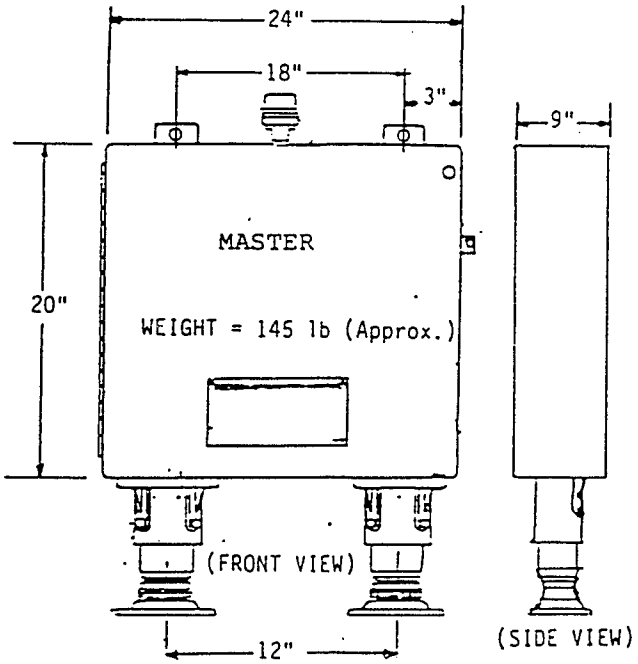


FIGURE 8-1. DIMENSIONS AND WEIGHTS

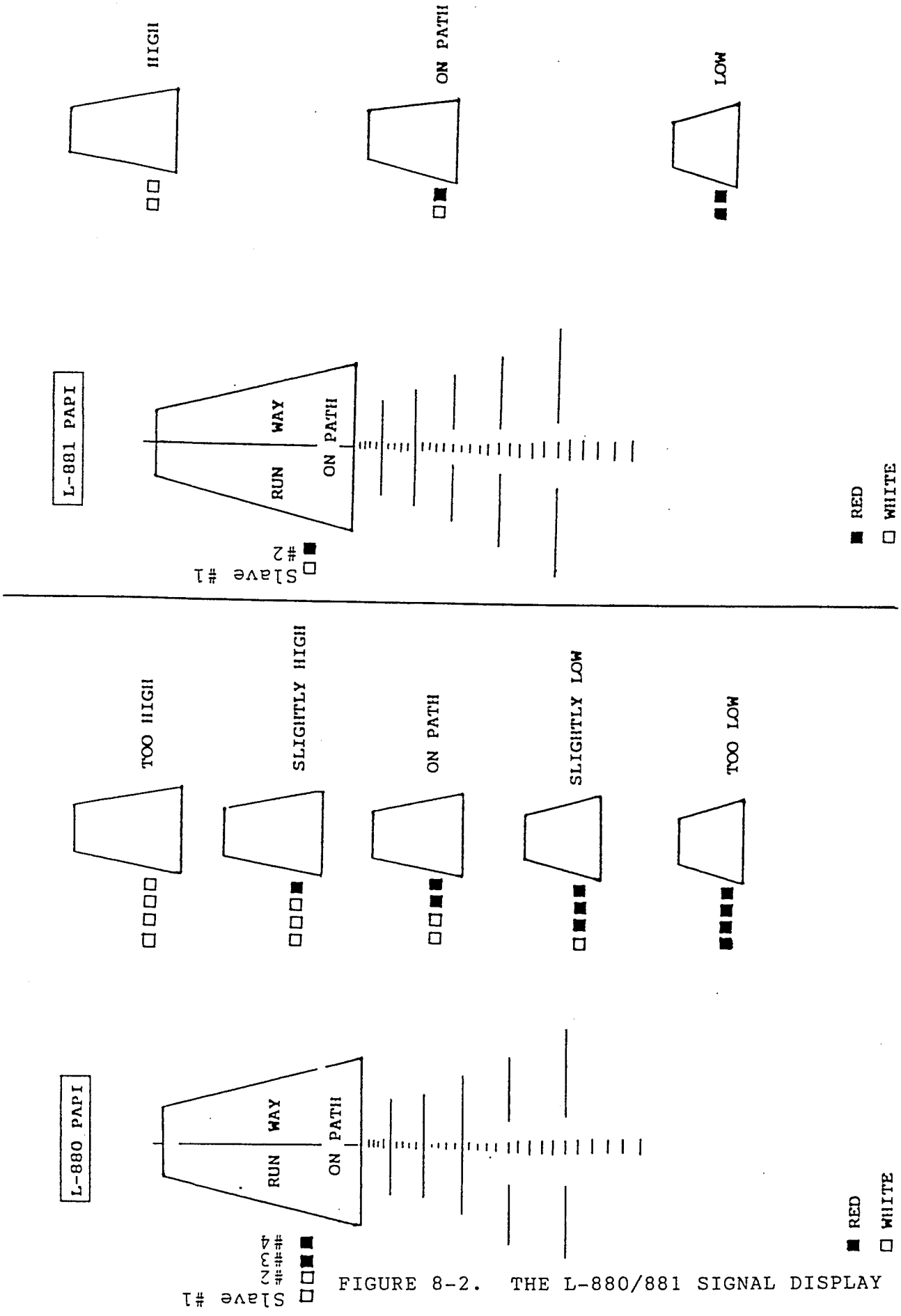


FIGURE 8-2. THE L-880/881 SIGNAL DISPLAY

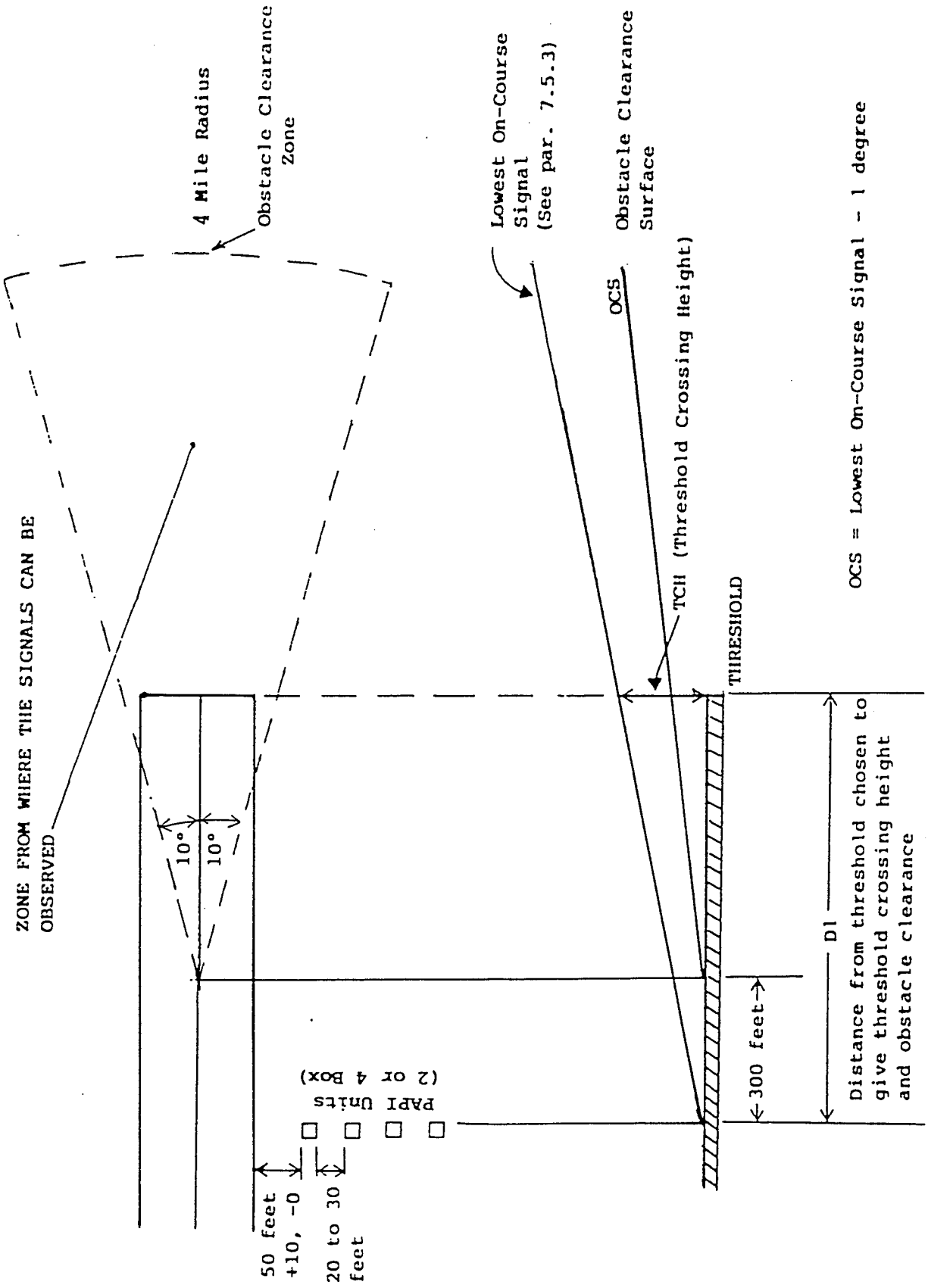
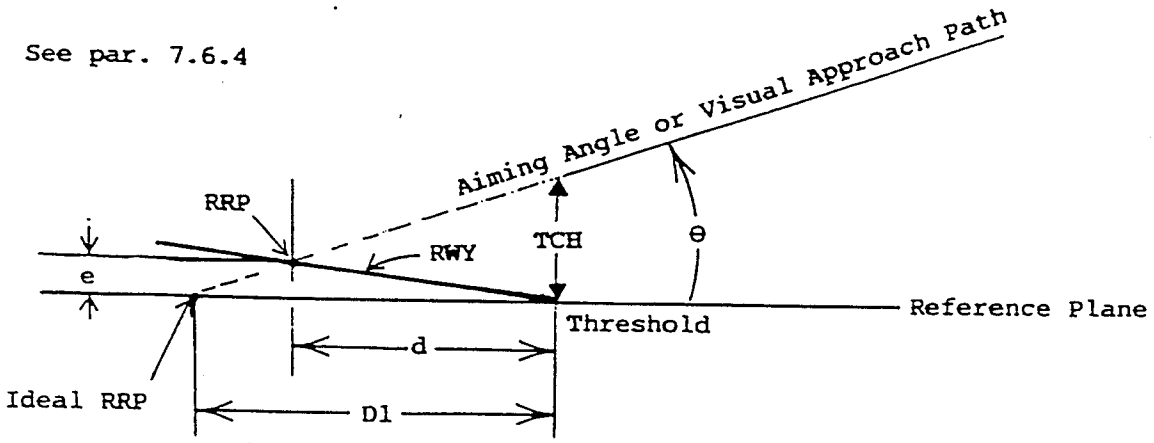


FIGURE 8-3. PAPI OBSTACLE CLEARANCE SURFACE (OCS)

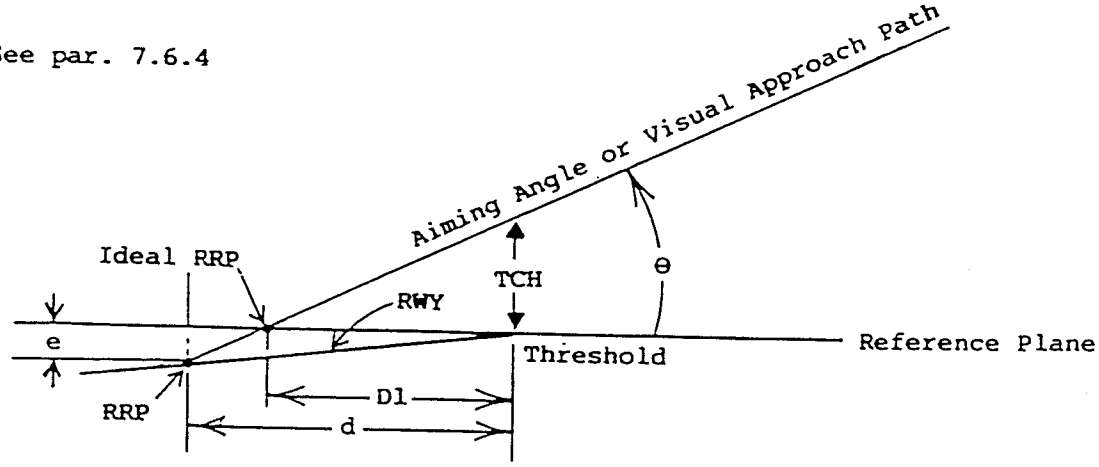
SITING STATION DISPLACED TOWARD THRESHOLD

See par. 7.6.4



SITING STATION DISPLACED FROM THRESHOLD

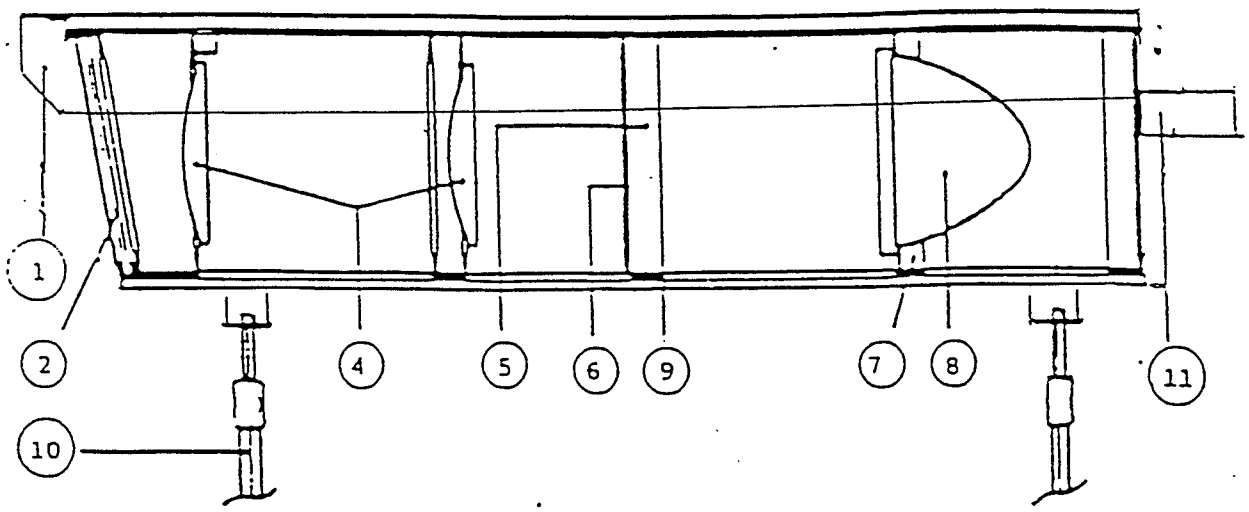
See par. 7.6.4



SYMBOLS

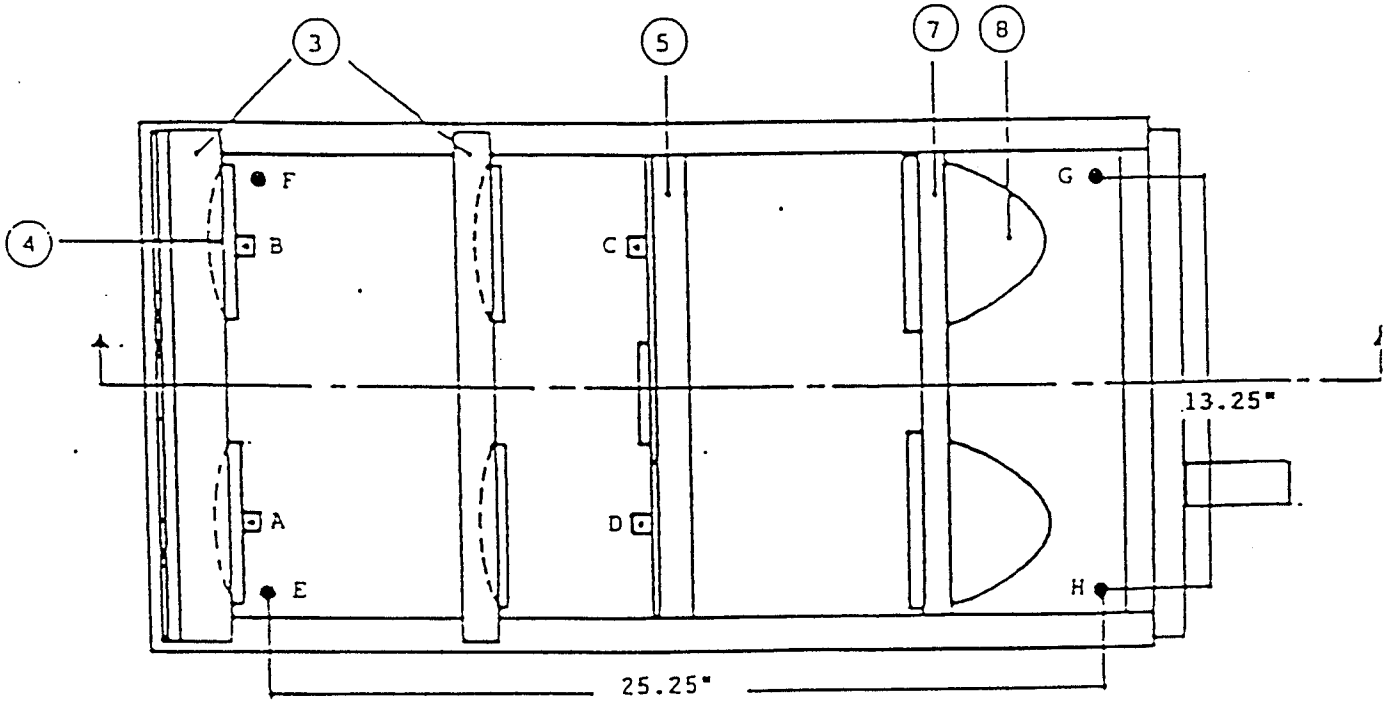
RWY = Runway longitudinal gradient
TCH = Threshold crossing height
RRP = Runway reference point (where aiming angle or visual approach path intersects runway profile)
D1 = Ideal (zero gradient distance of PAPI units from threshold
d = Adjusted distance of PAPI units from threshold
e = Elevation difference between threshold and RRP
θ = Aiming angle

FIGURE 8-4. CORRECTION FOR RUNWAY LONGITUDINAL GRADIENT



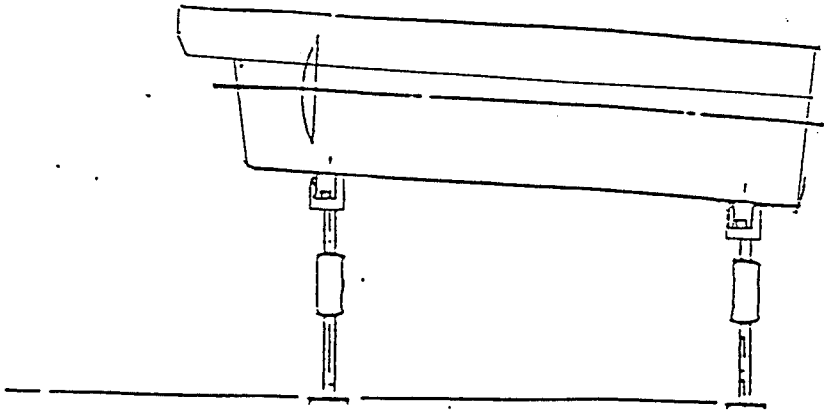
1-- Top Cover
2-- Protective Glass
3-- Lens Support Assy.
4-- Lenses Mounted on their Ring
5-- Filter Support Assy.
6-- Red Filter
7-- Reflector Support Assy.
8-- Reflector
9-- Box Assy.
10-- Leg
11-- Tilt Switch

DIMENSIONS IN INCHES



A, B, C, D -- REFERENCE SUPPORT FIXTURES
E, F, G, H -- ADJUSTABLE LEG POSITIONS

FIGURE 8-5. PAPI OPTICAL ASSEMBLY



MAXIMUM HEIGHT IS 40.00 INCHES, AS SHOWN IN FIGURE 8-1. SEE SECTION 7.7 FOR EXCEPTION.

NOTE: For old style adjustable leg (used on PAPI units shipped prior to April 1991) see Fig. 8-6.1

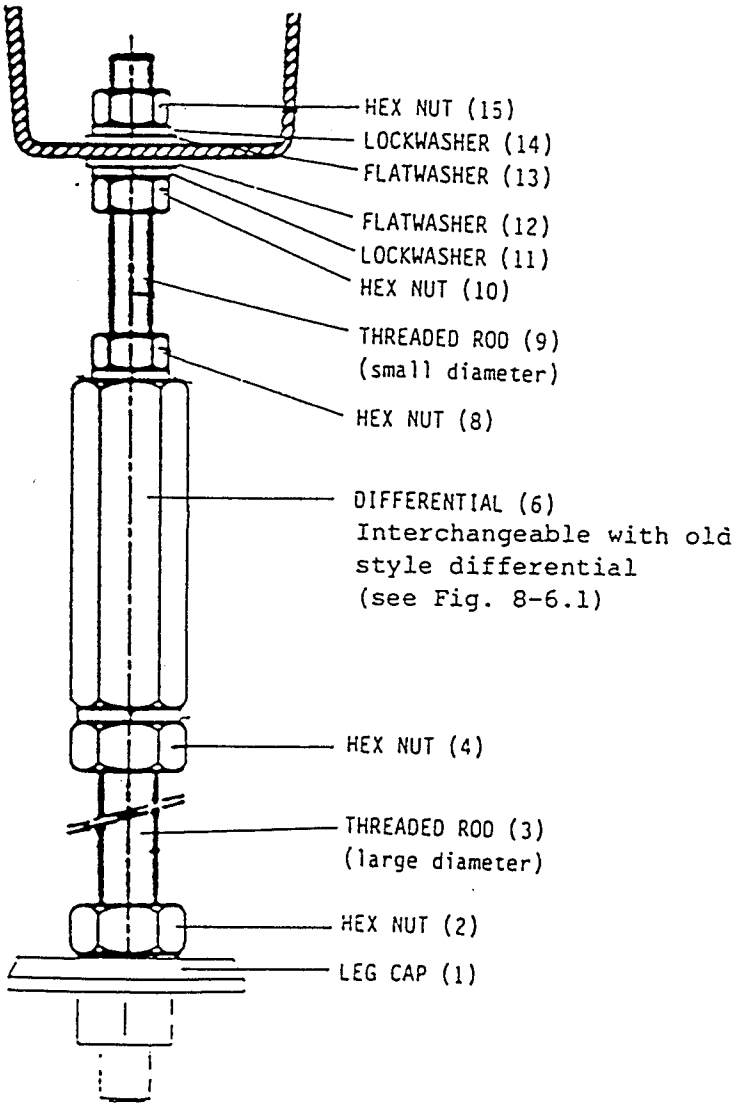


FIGURE 8-6. ADJUSTABLE LEG

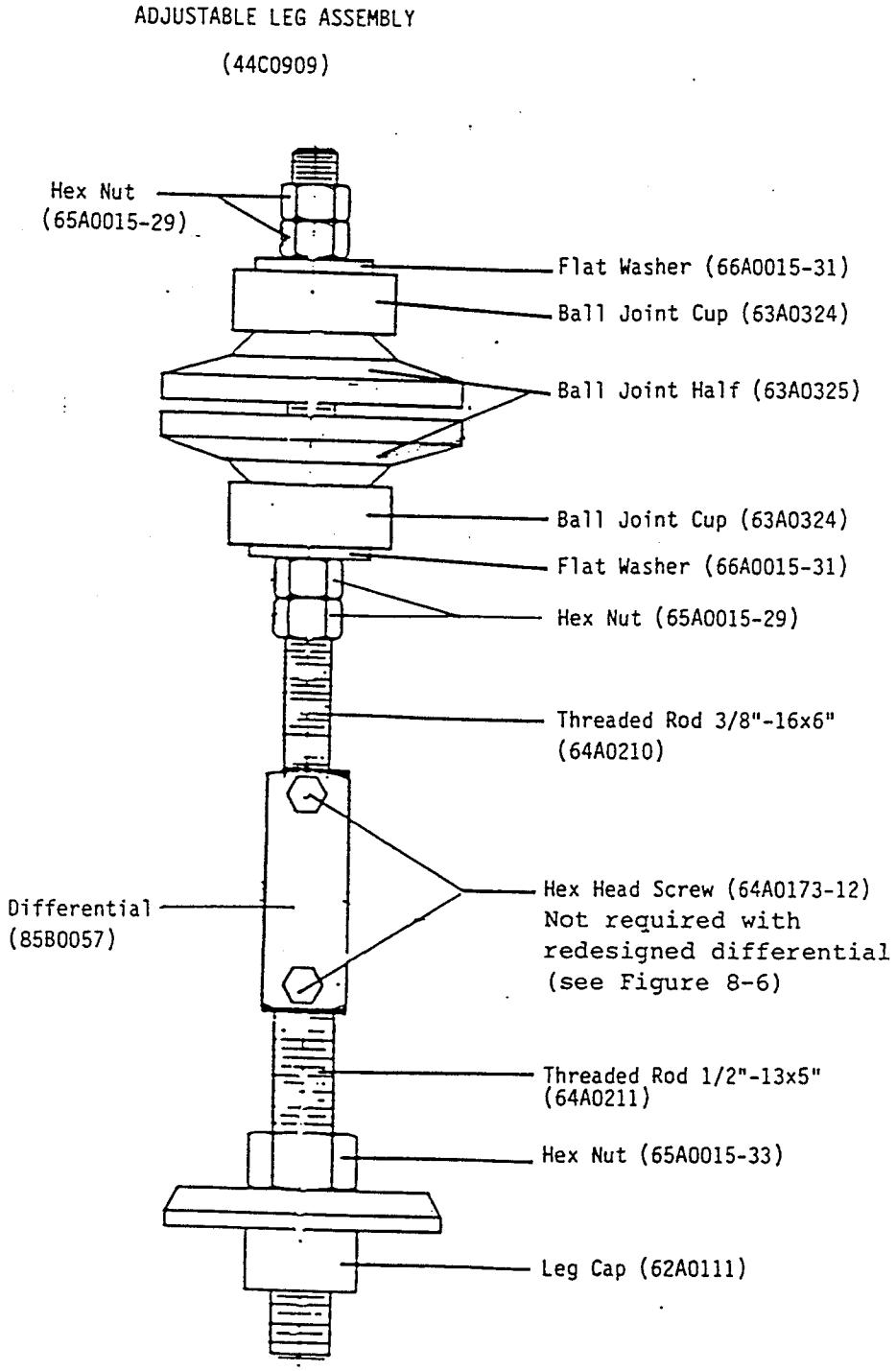
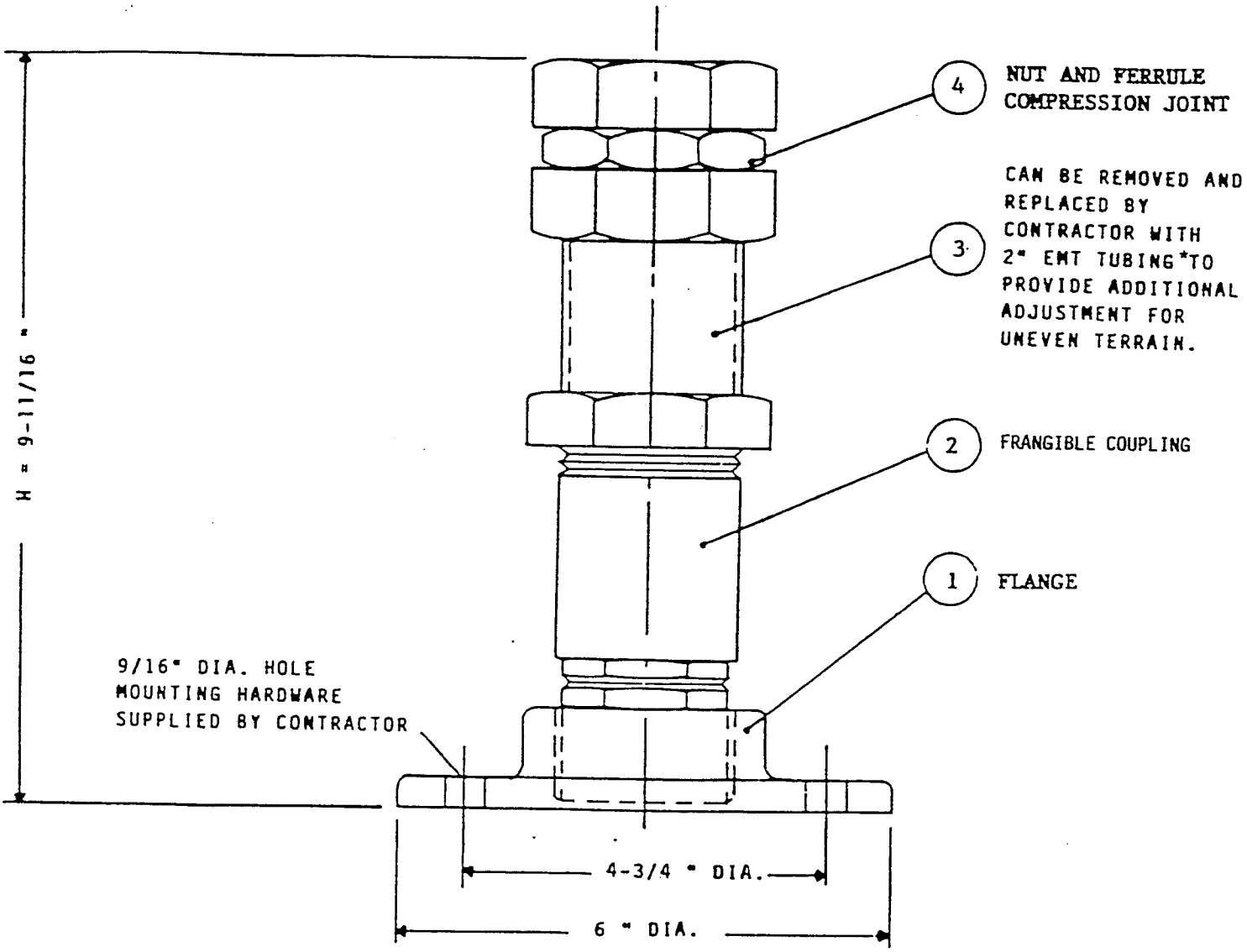


FIGURE 8-6.1 OLD STYLE ADJUSTABLE LEG ASSEMBLY
(used on PAPI units shipped prior to April 1991)



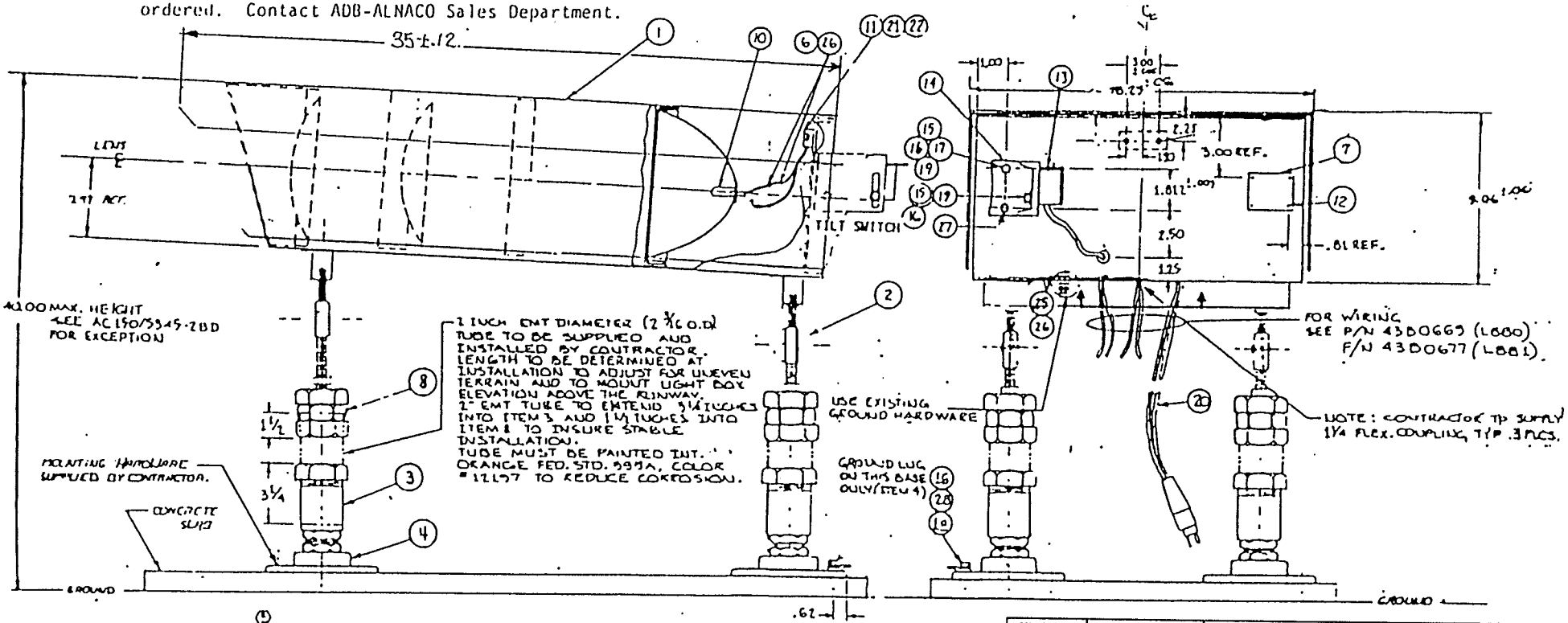
* Note: 2-inch EMT diameter (2-3/16 O.D.) tube to be supplied and installed by contractor. Length to be determined at installation to adjust for uneven elevation above the runway. 2" EMT tube to entend 3.25" into frangible coupling (Item 2) and 1½ inches into Item 4 to insure stable installation. Tube must be painted International Orange Fed. Std. 595A, color #12197 to reduce corrosion.

FIGURE 8-7. FRANGIBLE COUPLING

NOTE: The nominal L-823 cordset length is 31 in. Since the length required for installation will depend on the height of the PAPI unit and distance of the bottom of the unit from the wire entry point in the can or conduit, the customer should check the length required. If a longer cordset is required, the wires may be spliced (in accordance with local codes) or a longer cordset may be ordered. Contact ADB-ALNACO Sales Department.

TABLE

PAPI ASSY. No.	ITEM 13	TEMP. REF.
44C1417-1	44C1267-1	-55°C
44C1417-2	44C1267-2	-35°C



44C1417 - X

1 - W/HEATER
2 - W/OUT HEATER

ITEM	PART NO.	PART NAME/DESCRIPTION	QTY.
15	64A0173-12	SCREW, HEX HD 1/4-20x3/4	4
16	66A0026-24	LOCKWASHER, SPLIT	2
17	65A0015-24	NUT, HEX 1/4-20	2
18	64A0173-8	SCREW, HEX HD. 1/4-20x1/2	3
19	66A0015-25	FLATWASHER	4
20	73A0009-29	CORD SET, L823	3
21	64A0194-6	SCREW, RD. HD., 6-32x3/8	2
22	66A0038-3	LOCKWASHER, #6 INT. TH.	2
23	77A0073	CONNECTOR, CABLE	1
24	67A0006-3	SILICONE RUBBER, GE-122	A/R
25	70A0143	TERMINAL, RING 1/4 STUD	1
26	89A0014-9	WIRE, AWG 14, WHITE	A/R
27	70A0289	TERMINAL, RING, 3/8 STUD	1
28	72A0010	GROUND LUG	1

ITEM	PART NO.	PART NAME/DESCRIPTION	QTY.
1	44C0937	LIGHT BOX ASSEMBLY	1
2	44C0909	ADJUSTABLE LEG ASSEMBLY	4
3	44B0180	FRANGIBLE COUPLING ASSY.	4
4	62B0107-2	BASE FLANGE	4
5		NOT USED	
6	70A0233	TERMINAL, SLIP-ON, FEMALE	4
7	42A0307	LABEL	1
8	77A0009	COUPLING	4
9		NOT USED	
10	48A0077	LAMP	2
11	72A0047-6	TERMINAL BLOCK	1
12	65A0043-3	RIVET OPEN-END POP	4
13	44C1267-X	TILT SWITCH ASSY	1
14	62B0105	TILT SWITCH SUPPORT	1

FIGURE 8-8. PAPI ASSEMBLY --EXTERNAL CONNECTIONS

ITEM #	PART #	PART NAME	QTY
1	60C0655	Box Modification	1
3	48A0089	Photocell	1
4	49A0095	Socket, Photocell	1
5	67C0068-7	Hub Mounting	2
6	62B0064	Frangible Coupling	2
7	62B0107-2	Base Flange	2
8	64A0173-12	Screw, Hex Hd 1/4-20 x 3/4	8
9	64A0173-16	Screw, Hex Hd, 1/4-20 x 1	8
10	66A0015-25	Flatwasher	8
11	66A0026-24	Lockwasher, 1/4 Split	8
12	44C1413-X	Panel Assembly, See Table A	1
13	65A0019-4	Drive Pin	4
14	65A0117	Sealing Nut 1/2-14	1

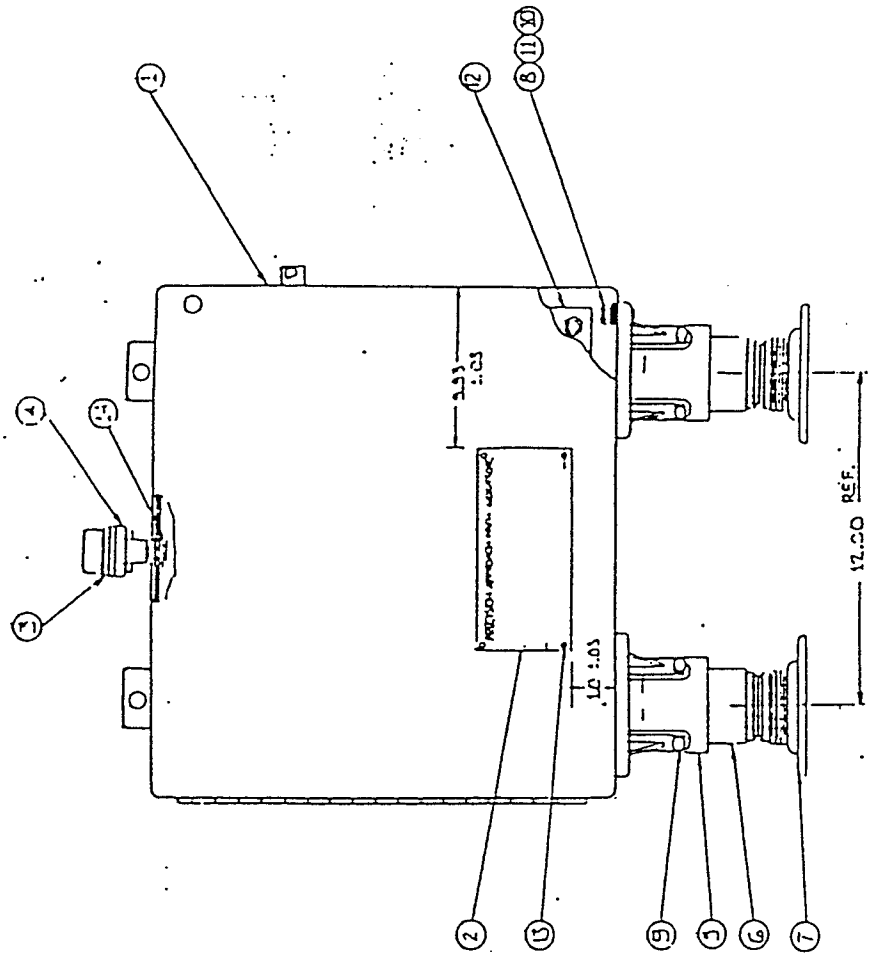
TABLE A

Type	Item 12	Box Assy
L880	44C1413-1	44C1405-1
L881	44C1413-2	44C1408-2

DO NOT SCALE DRAWING

ADB ALNACO

LBSO/BSI TYPE A, MASTER BOX ASSEMBLY



See Figure 8-16 for installation.

FIGURE 8-9. MASTER BOX ASSEMBLY

ITEM #	PART #	PART NAME	QTY
1	See Table A	Panel, 17 x 21	1
2	64A0191-6	Screw, Pan Hd, #8-32 x 3/8	16
3	49A0075	Socket, Relay	1
4	64A0197-8	Screw, Rd. Hd., #8-32 x 1/2	12
5	64A0173-8	Screw, Hex Hd., 1/4-20 x 1/2	7
6	66A0026-15	Lockwasher, #8 Split	10
7	66A0026-24	Lockwasher, 1/4 Split	9
8	66A0039-5	Lockwasher. Ext. Th. #8	18
9	65A0015-24	Nut, Hex, 1/4-20	2
10	64A0173-6	Screw, Hex Hd., 1/4-20 -3/8	2
11	64A0198-4	Screw, Pan Hd, #6-32 x 1/4	2
12	66A0026-11	Lockwasher, #6 Split	4
13	65A0015-15	Nut, Hex Hd, #8-32	2
14	60C0662	Bracket	1
15	89A0081-1	Wire, 6 AWG, 600V, White	A/R
16	89A0008-9	Wire, 16 AWG, 600V, White	A/R
17	63A0081-3	Cable Tie	A/R
18	72A0071	Terminal Block	13
19	72A0070	Terminal Block End	2
20	72A0066	Terminal Block	15
21	72A0067	Terminal Block End	3
22	47A0068	Fuse, 1/10 A, Slow Blow	1
23	47A0119	Fuse, 1/2 A, Slow Blow	1
24	47A0024	Fuse, 30 A, Slow Blow	1
25	49A0040	Fuse Holder	2
26	49A0033	Fuse Holder	1
27	32A0011	Varistor	1
28	45A0268	Switch, DPDT	1
29	35B0142	Transformer	1
30	53A0198	Contactor	1
31	49A0078	Relay Socket	1
32	53A0183	Relay, 120 Vdc	1
33	53A0270	Relay, 24 Vac, DPDT, 10A Cont.	1
34	49A0050	Relay Socket	1
35	53A0186	Relay, Time Delay	1
36	53A0199	Contactor	1
38	54A0007	Thermostat	1
39	See Table A	Transformer	1
40	49A0077	Spring, Relay Hold Down	1
41	70A0291	Terminal, Ring, 3/8 AWG 6	1
42	57A0029	Circuit Breaker, 30A	1
43	70A0143	Terminal, Ring 1/4 Stud, AWG 16-14	3
44	70A0208	Terminal, Fork #6 Stud, AWG 18-14	22
45	70A0264	Terminal, Female Slip-On, Ins.	3
46	72A0022	Terminal, Ring #8 Stud, AWG 14-16	1
49	89A0056	Wire, 12 AWG, 600V, White	A/R
52	64A0194-8	Screw, Rd. Hd., #6-32 x 1/2	2
53	49A0076	Spring, Relay Hold Down	2

4.4.C.1.4.1.3.- .X D

TABLE A

Type	Item 1	Item 39	Panel Assy
L880	60C0669	35B0208	44C1413-1
L881	60C0669	35D0214	44C1413-2

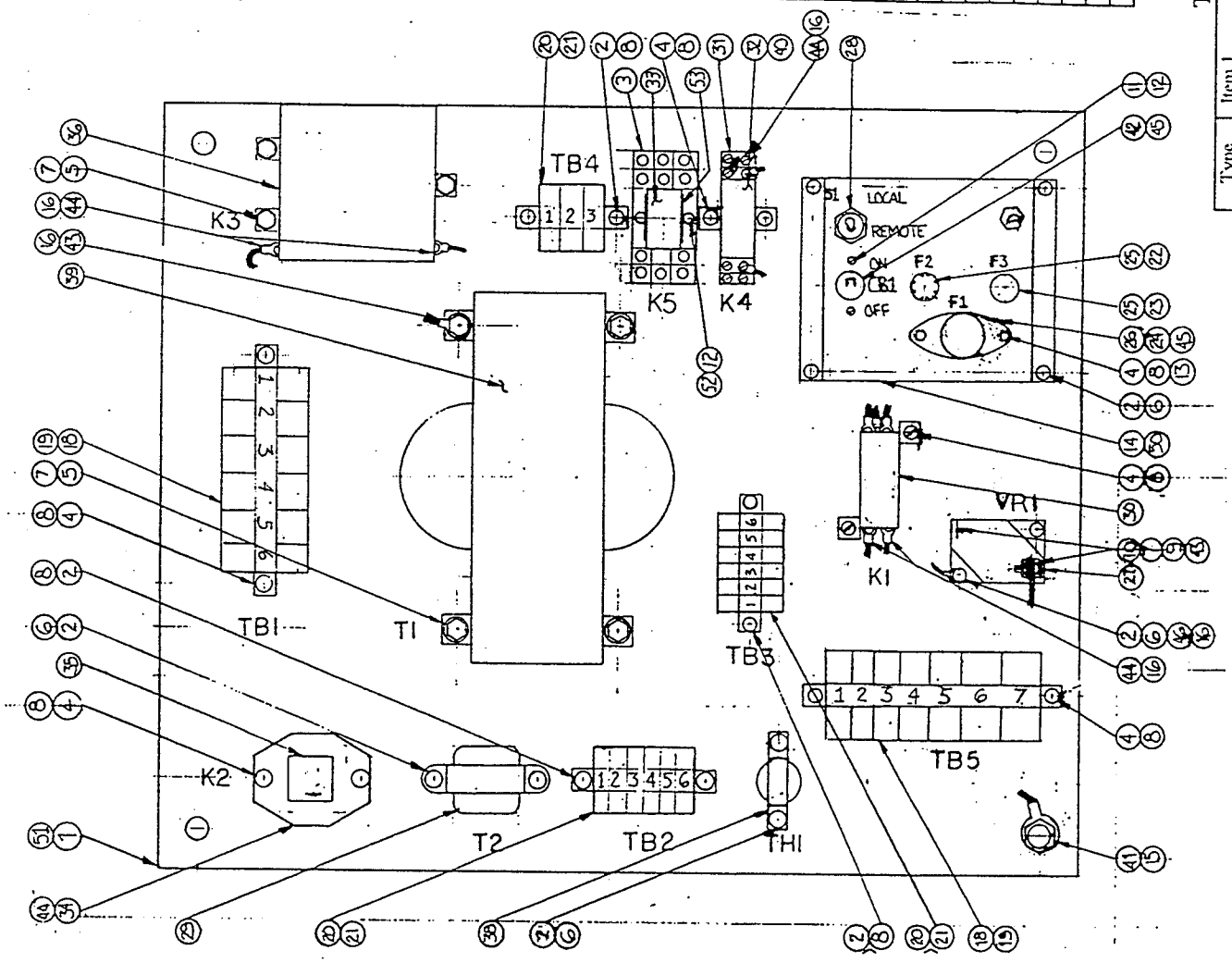


FIGURE 8-10. MASTER PANEL ASSEMBLY

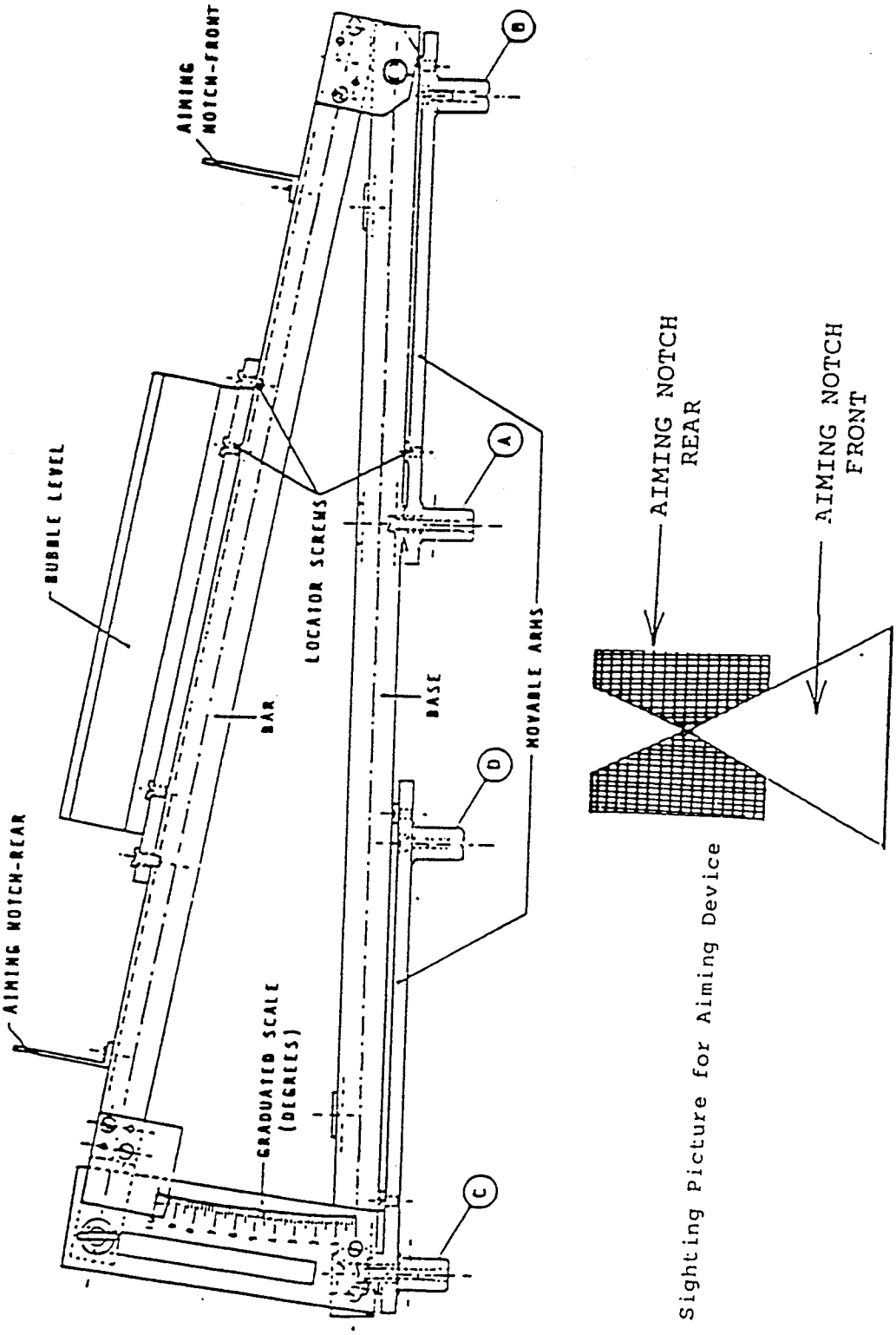
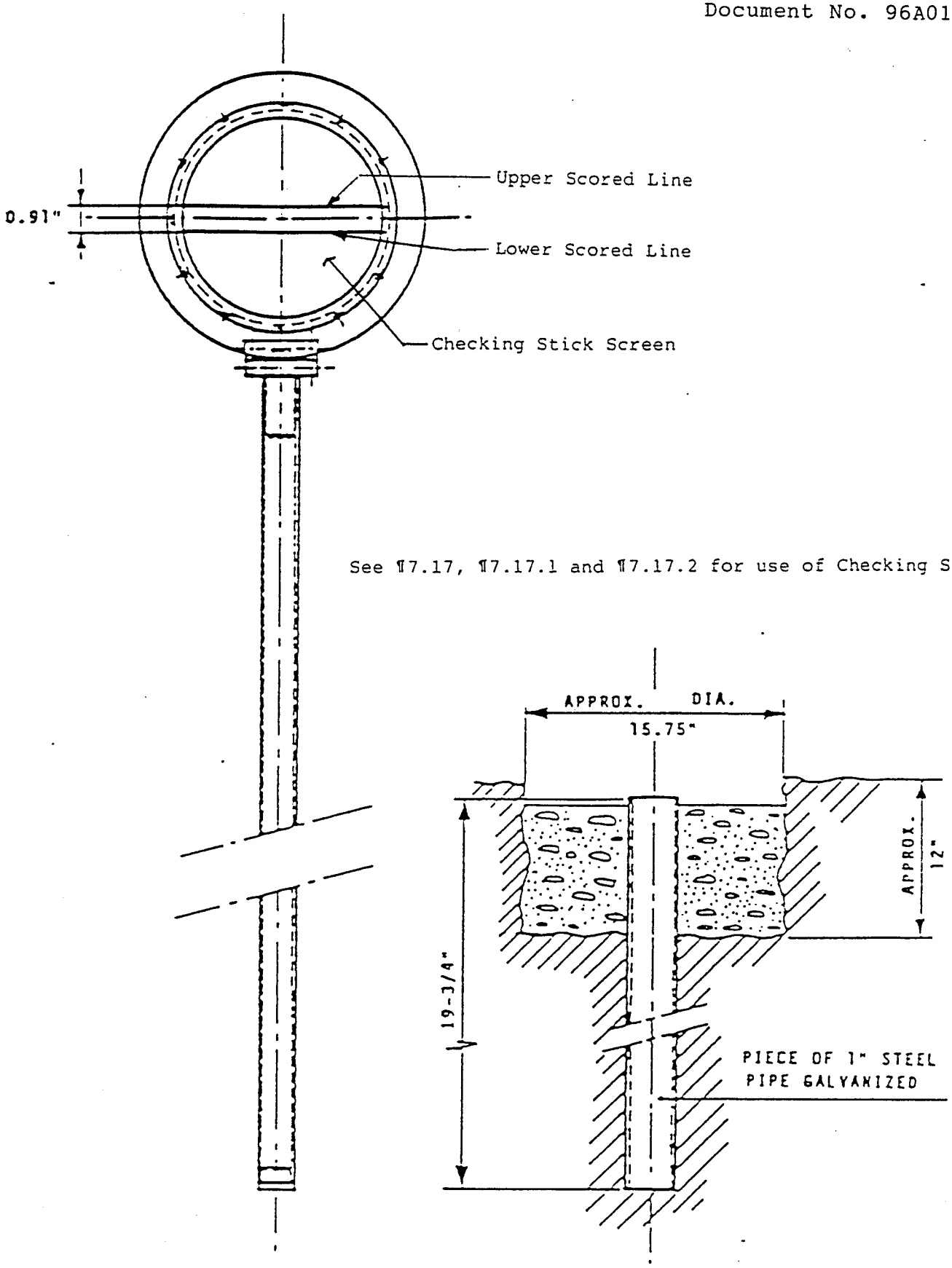
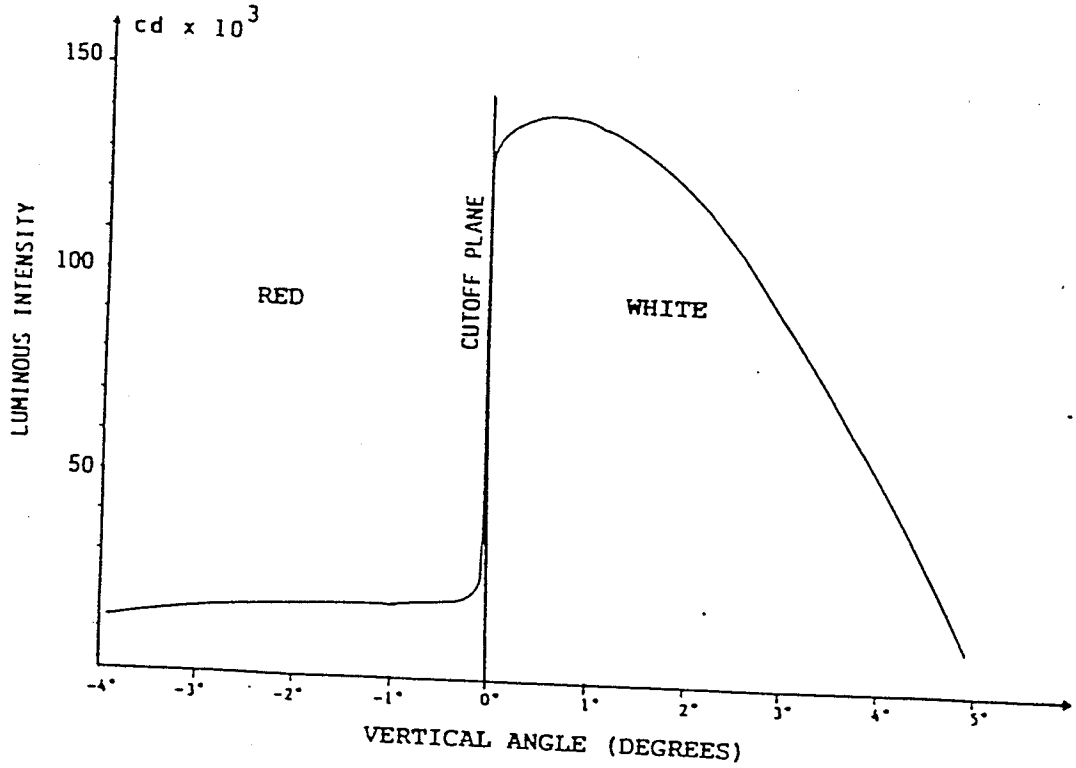


FIGURE 8-11. AIMING DEVICE



See ¶7.17, ¶7.17.1 and ¶7.17.2 for use of Checking Stick

FIGURE 8-12. CHECKING STICK



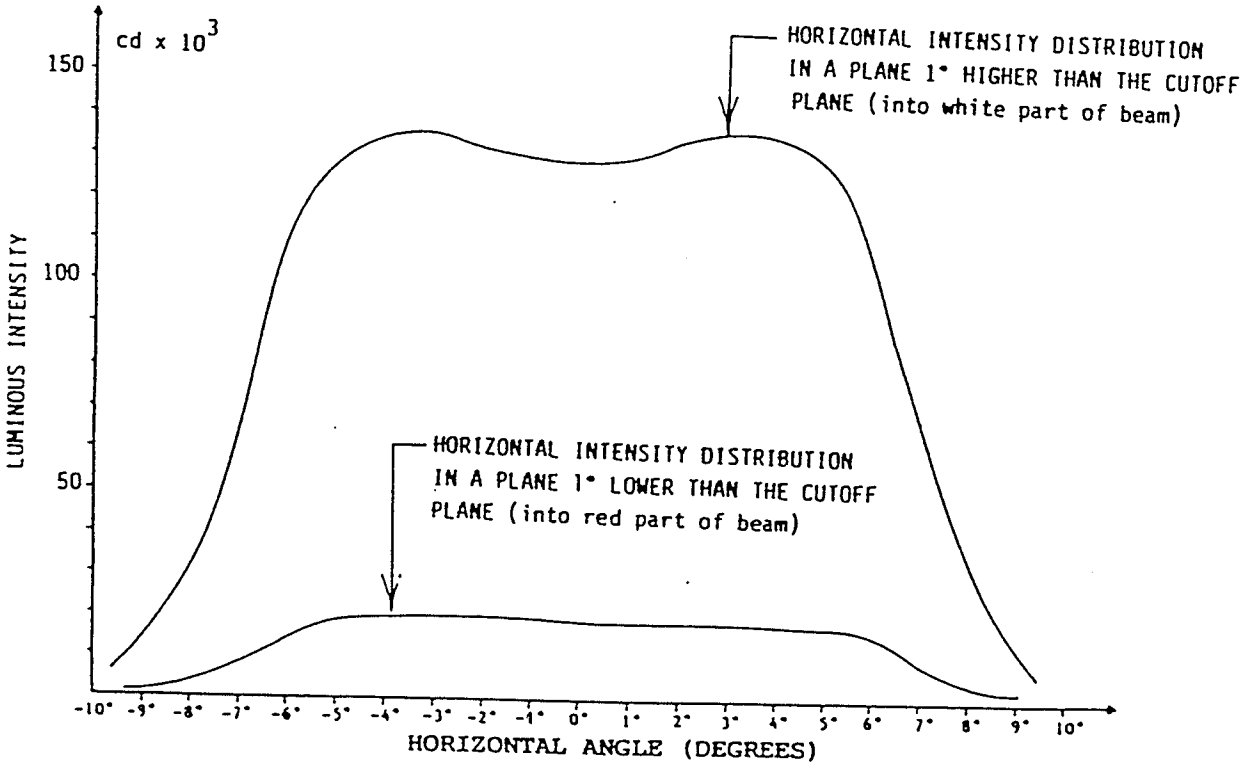


FIGURE 8-13. PHOTOMETRIC INTENSITY DISTRIBUTION

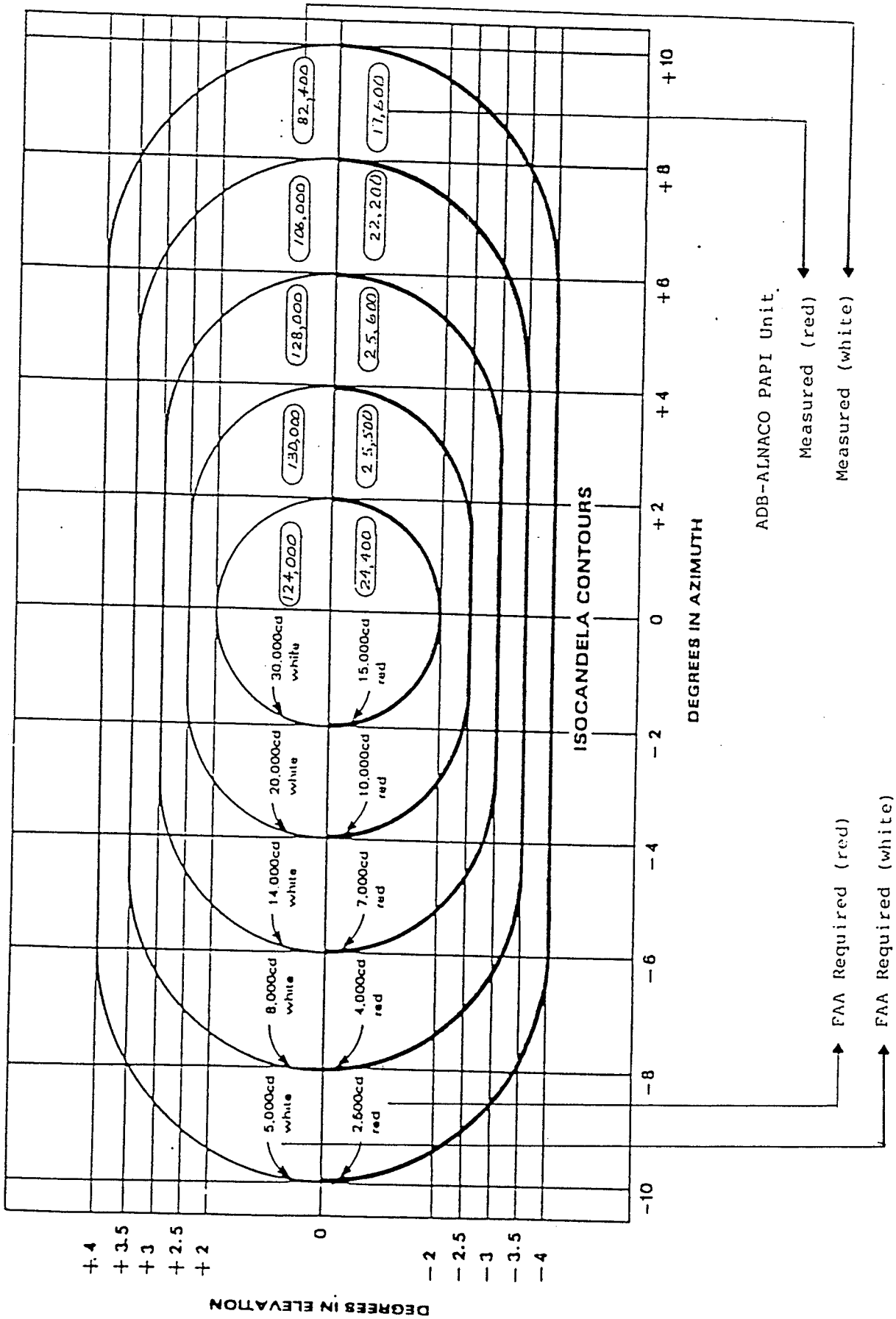


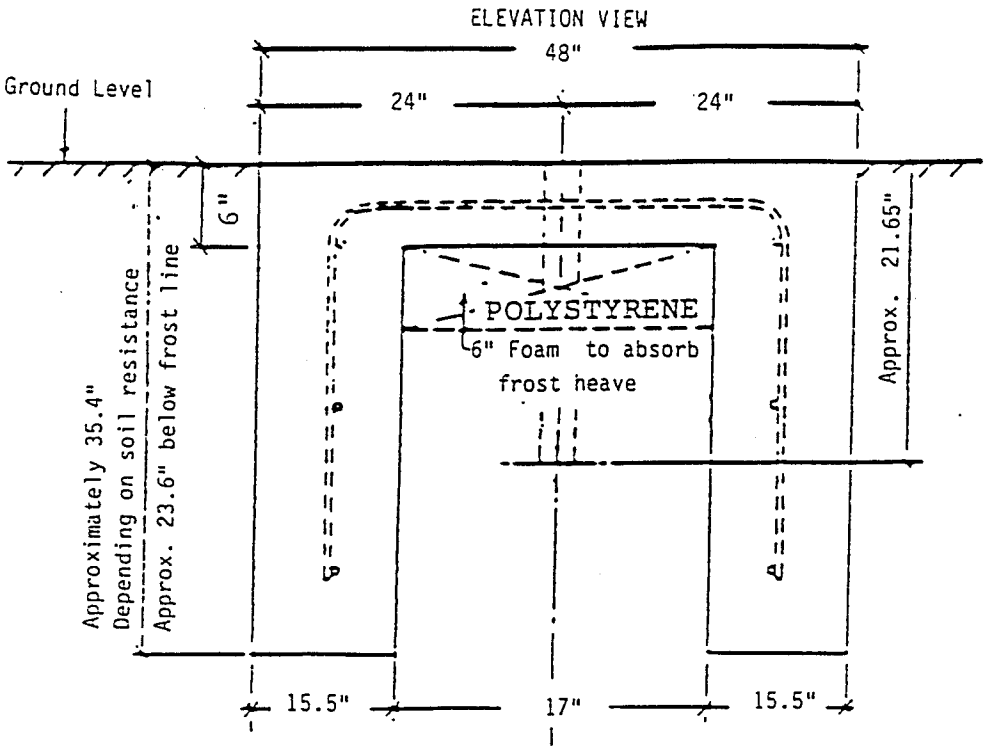
FIGURE 8-14. FAA LIGHT INTENSITY REQUIREMENTS VS. MEASURED

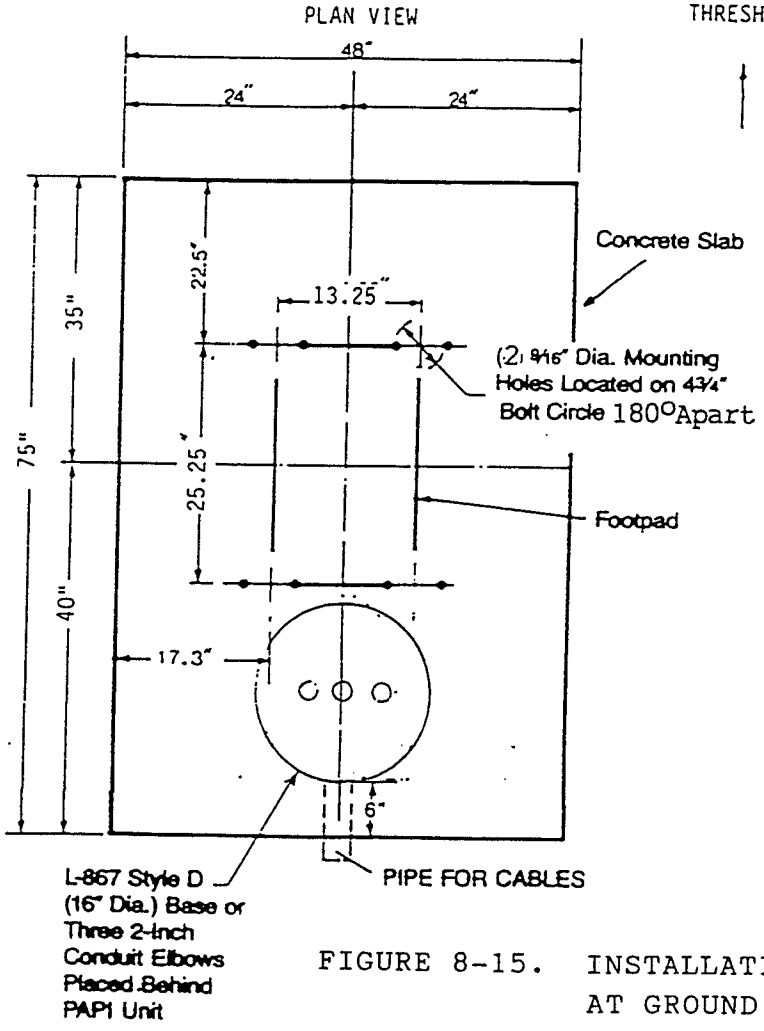
Document No. 96A0136

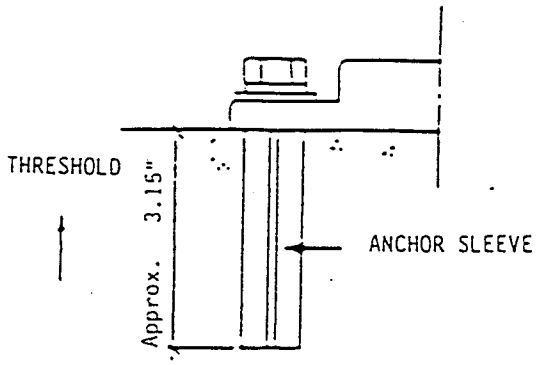
Foundation details are given only as a guide. The appropriate depth and reinforcement of the pad will depend on local site conditions.

NOT TO SCALE

DIMENSIONS IN INCHES







OR

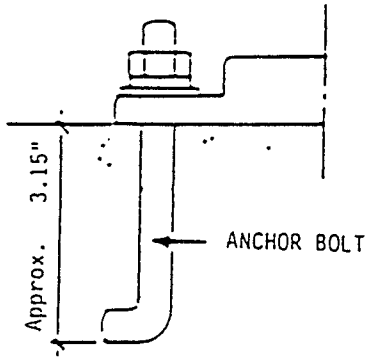
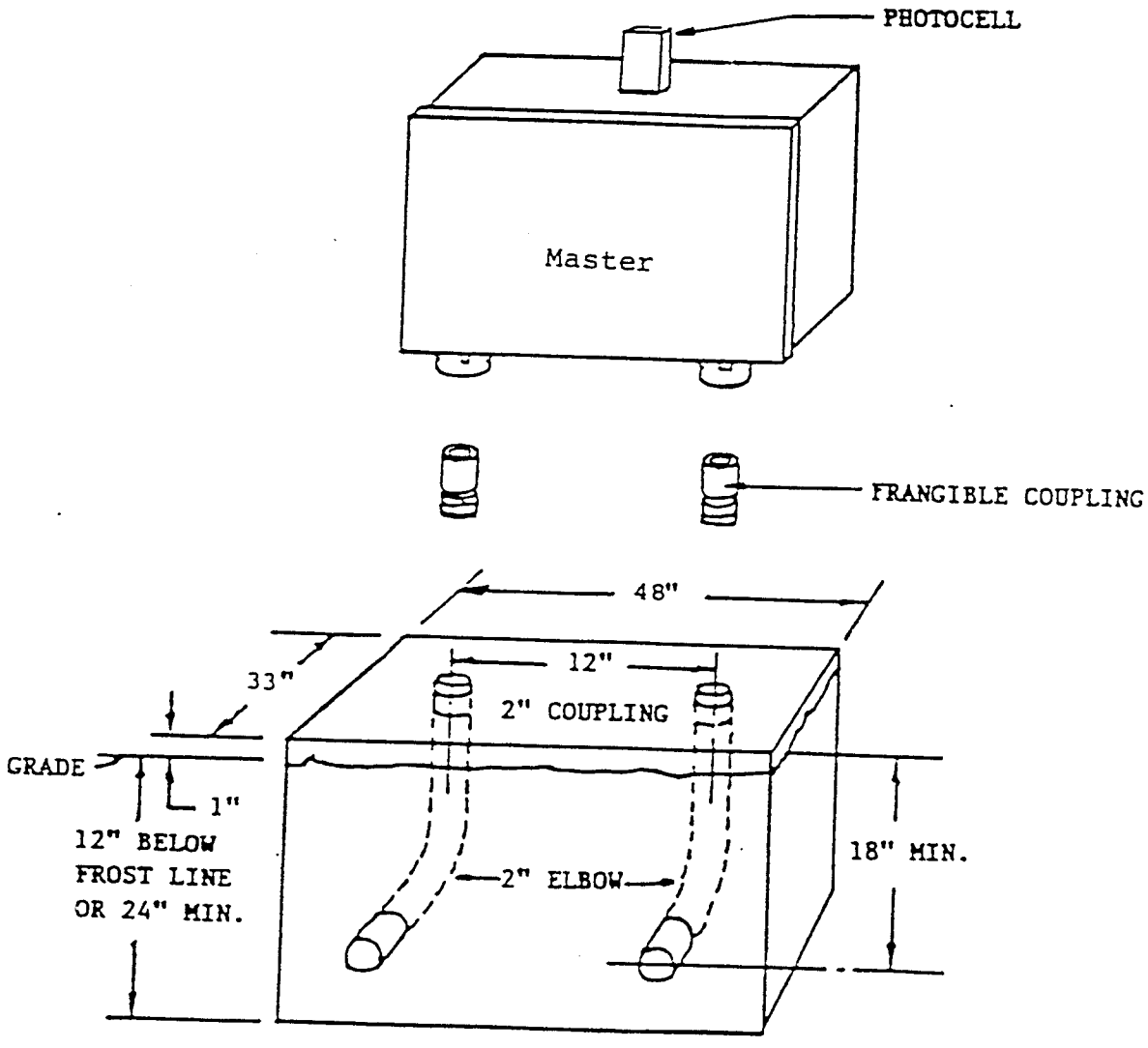


FIGURE 8-15. INSTALLATION ON CONCRETE SLAB AT GROUND LEVEL

Note: The Master should be located behind (0 to 100 ft) the Slave unit that is the most distant from the runway. See ¶7.14.



The concrete foundation should extend at least 1 foot beyond the box to minimize damage from mowers.

FIGURE 8-16. MASTER INSTALLATION

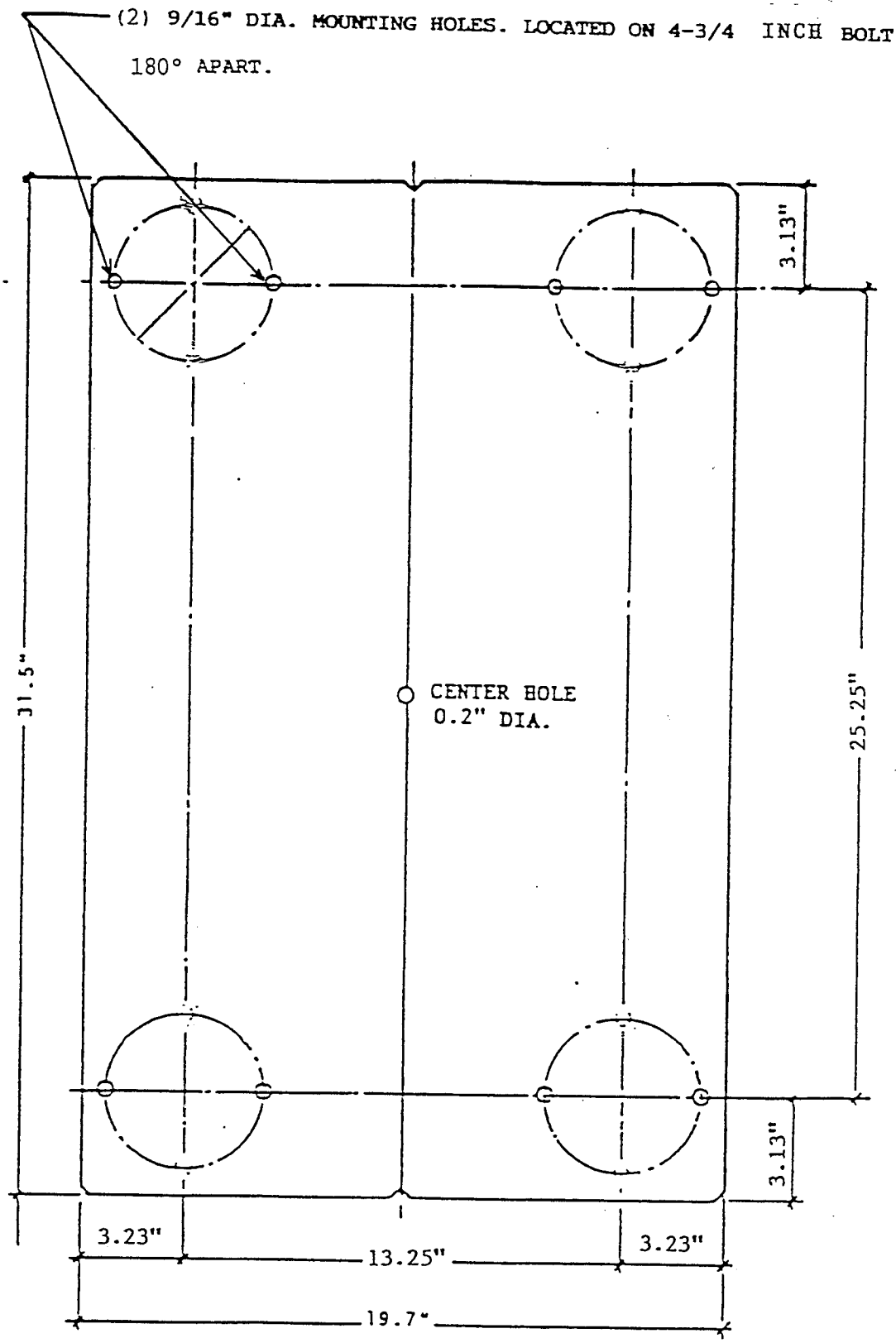
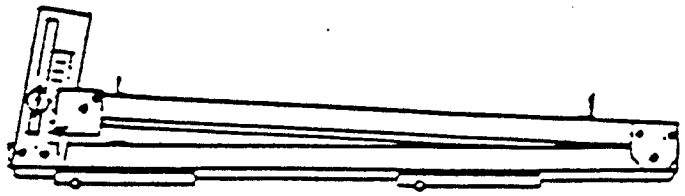


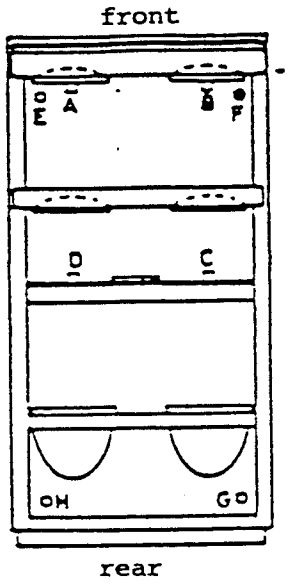
FIGURE 8-17. POSITIONING PLATE

REAR (NEAR C)



FRONT (NEAR B)

STEP 1.

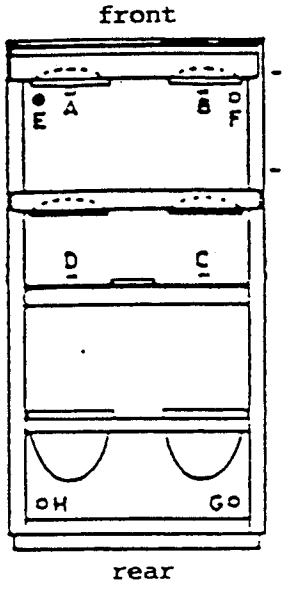


- SET & BLOCK LEG F.

-LINE OF OBJECTIVE LENSES AT HEIGHT "d" AS REQUIRED.

- AIMING IN AZIMUTH

STEP 2.

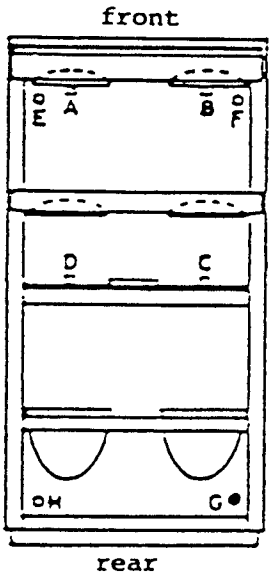


- BUBBLE LEVEL BETWEEN AB.

- SET & BLOCK LEG E.

- LINE OF OBJECTIVE LENSES LEVELLED.

STEP 3.

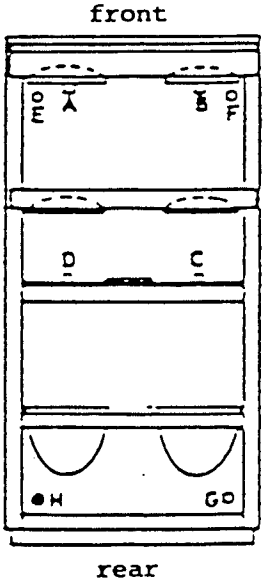


- BUBBLE LEVEL BETWEEN BC.

-SET & BLOCK LEG G.

-ANGLE OF SITE AS REQUIRED

STEP 4.



-BUBBLE LEVEL BETWEEN DC.

-SET & BLOCK LEG H.

-PLANING THE BOTTOM OF THE LIGHT UNIT.

FIGURE 8-18. ELEVATION SETTING SEQUENCE

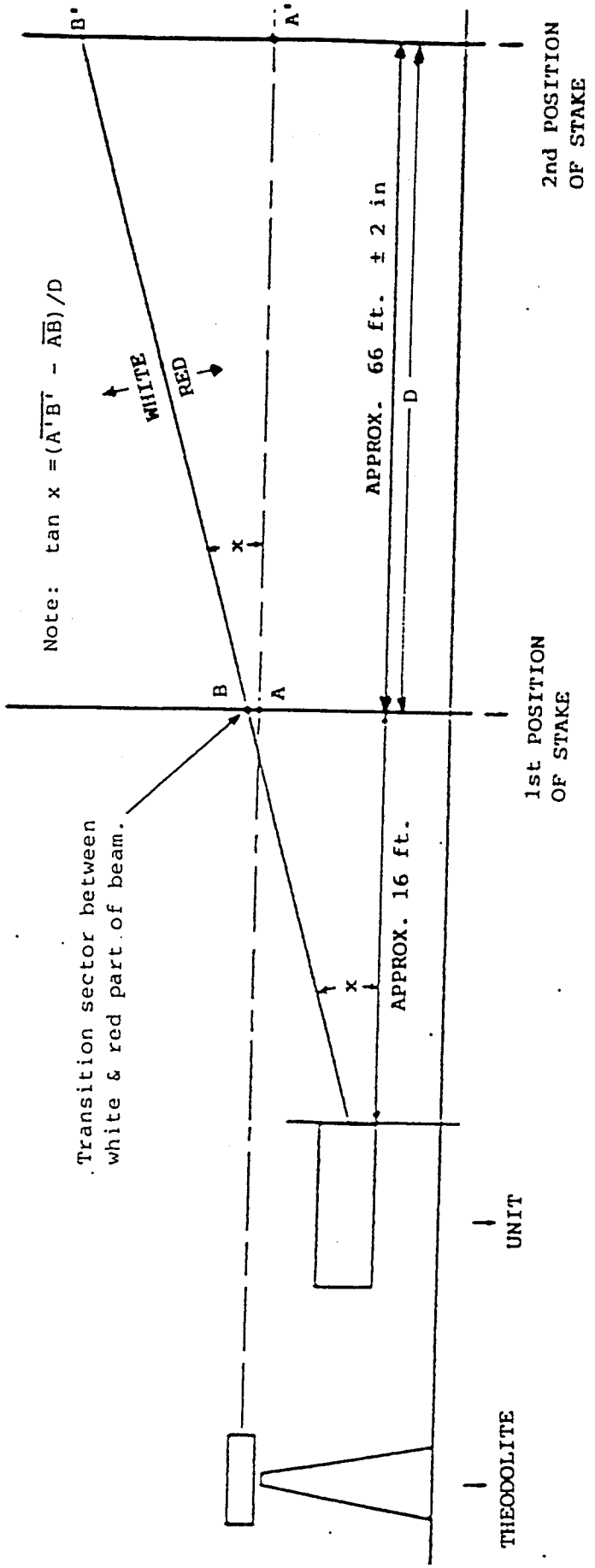


FIGURE 8-19. CHECKING SLOPE ANGLES

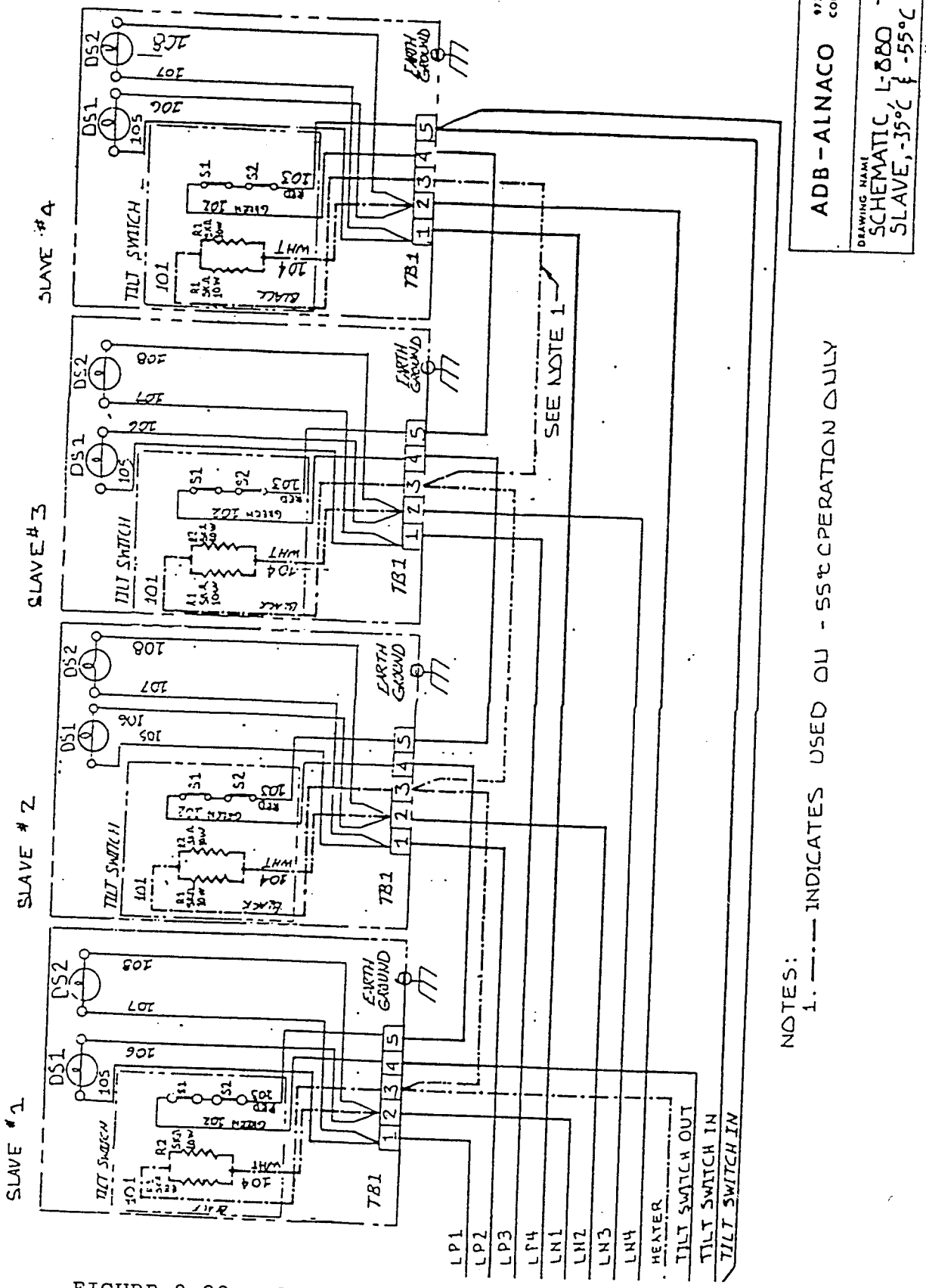
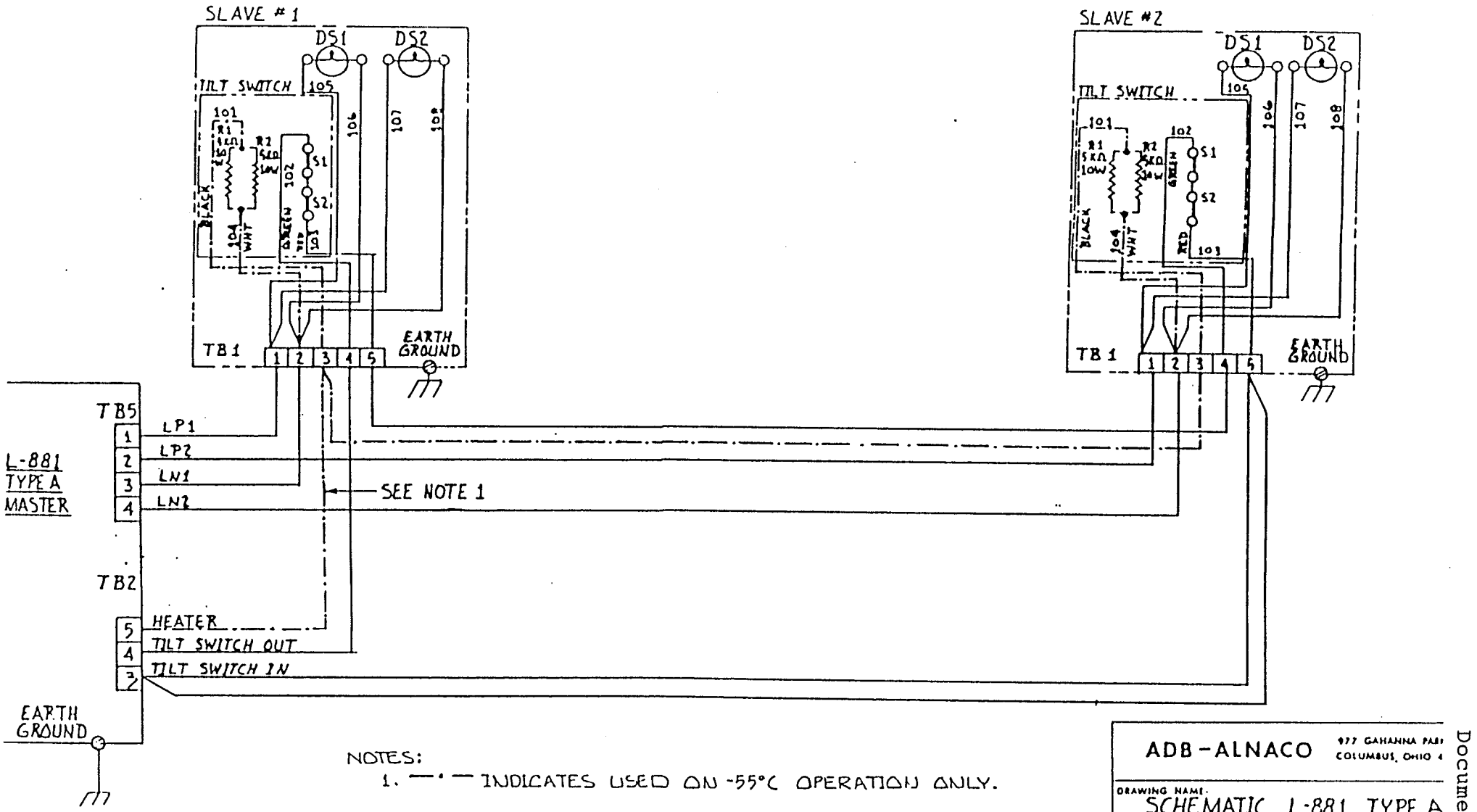


FIGURE 8-20. SCHEMATIC, L-880 PAPI SLAVE UNITS



NOTES:

1. —·— INDICATES USED ON -55°C OPERATION ONLY.

ADB-ALNACO 977 GAHANNA PARK COLUMBUS, OHIO 4

DRAWING NAME:
SCHEMATIC, L-881 TYPE A SLAVE, -35°C & -55°C

FIGURE 8-21. SCHEMATIC, L-881 PAPI SLAVE UNITS

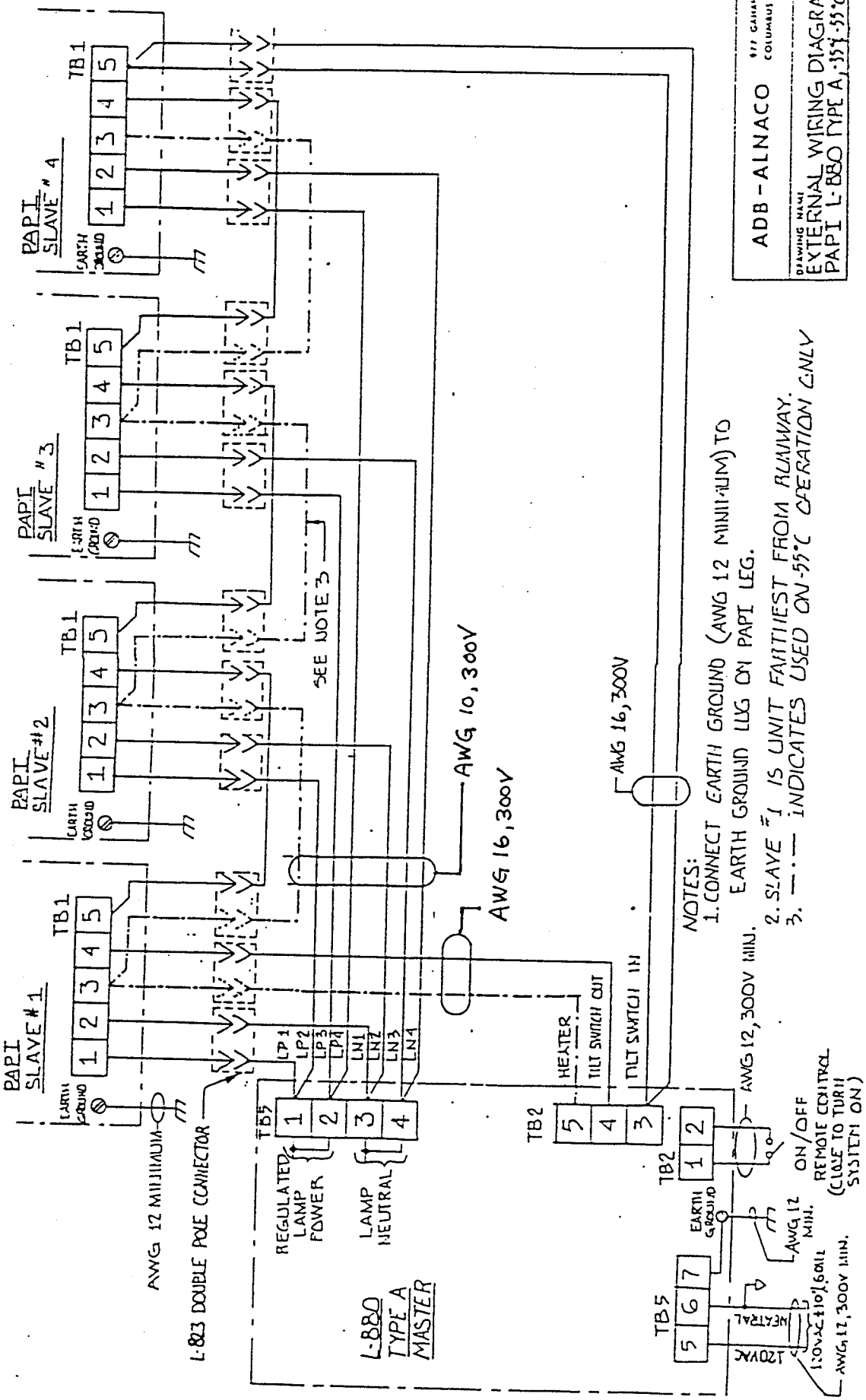


FIGURE 8-22. L-880 EXTERNAL WIRING DIAGRAM

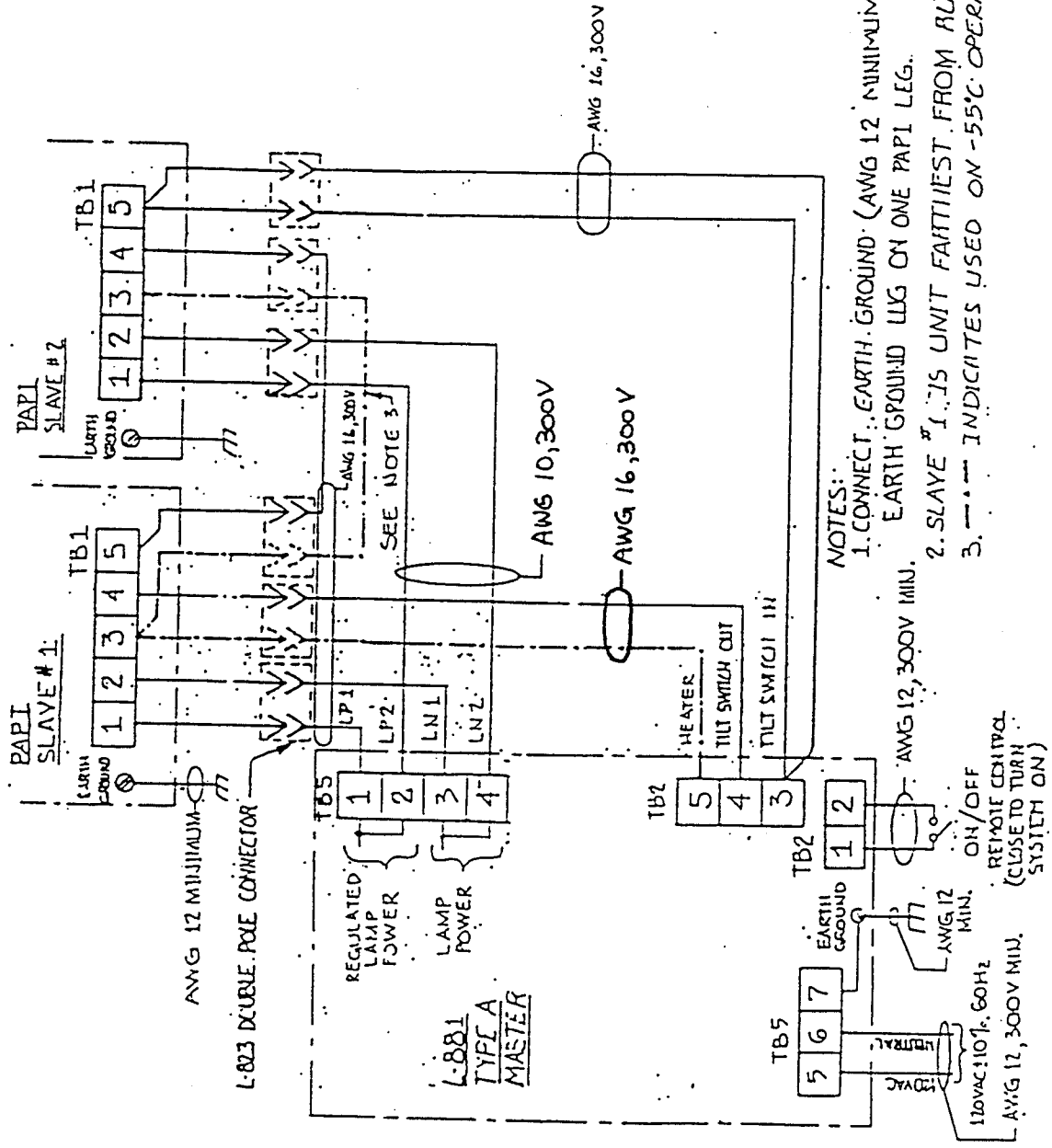
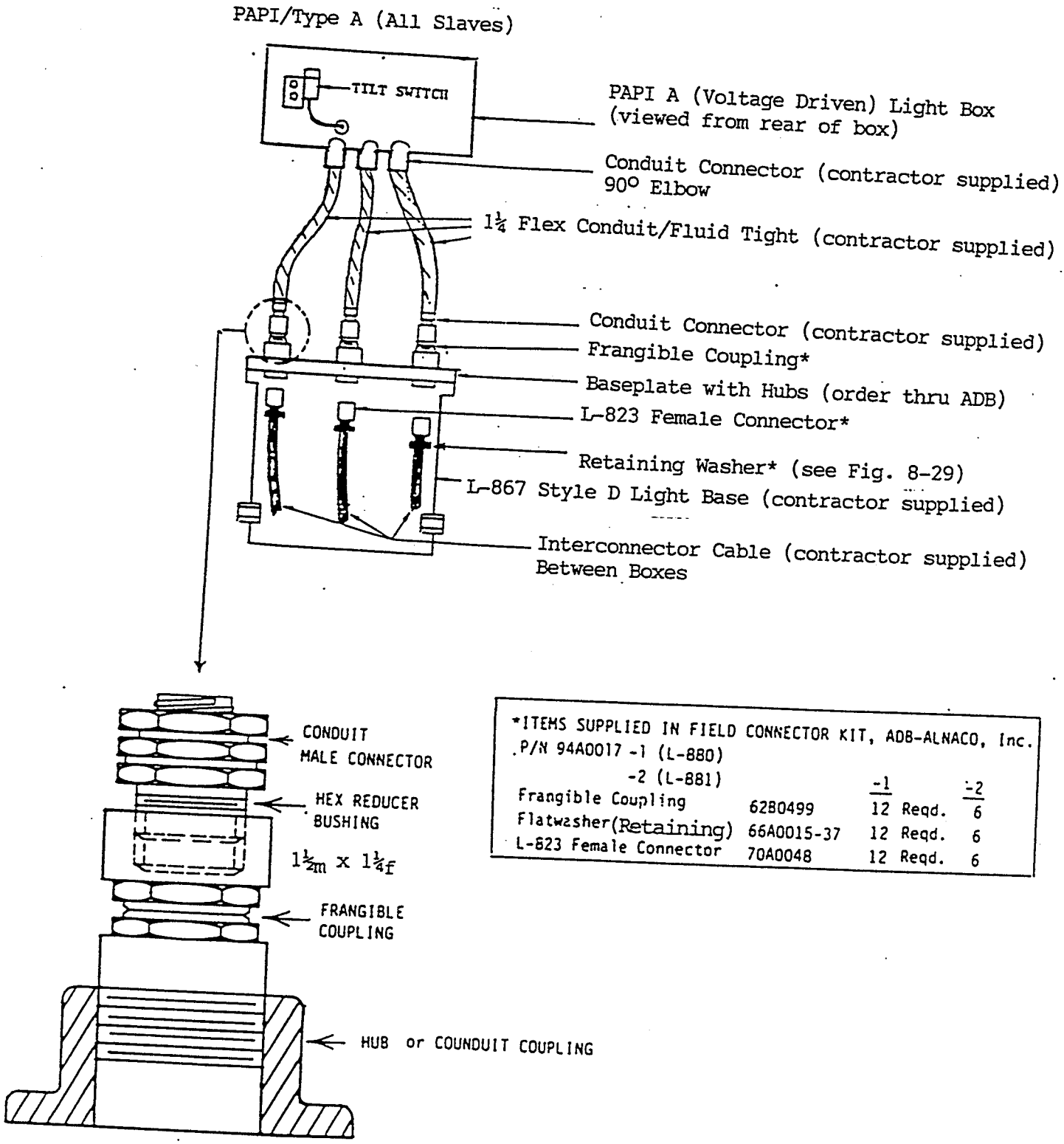


FIGURE 8-23. L-881 EXTERNAL WIRING DIAGRAM

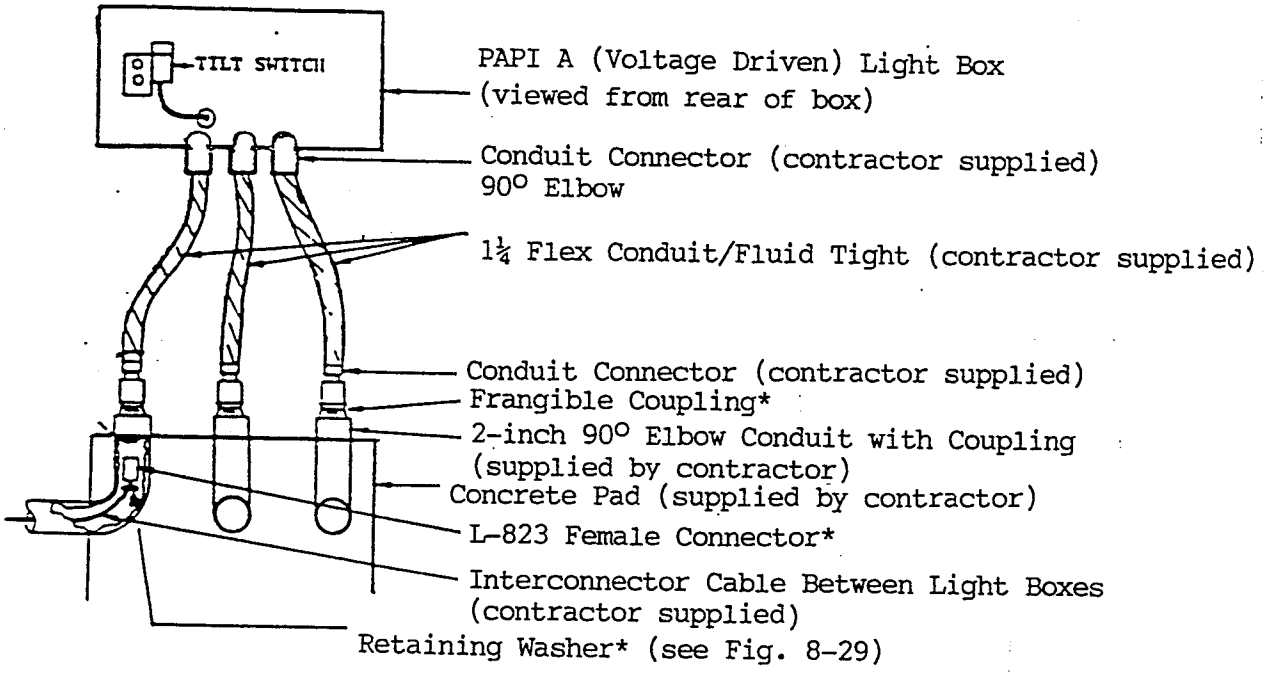


*ITEMS SUPPLIED IN FIELD CONNECTOR KIT, ADB-ALNACO, Inc. P/N 94A0017 -1 (L-880) -2 (L-881)

		-1	-2
Frangible Coupling	62B0499	12 Reqd.	6
Flatwasher(Retaining)	66A0015-37	12 Reqd.	6
L-823 Female Connector	70A0048	12 Reqd.	6

FIGURE 8-24. PAPI CONDUIT CONNECTION (with L-867 Base)

PAPI/Type A (All Slaves)



*ITEMS SUPPLIED IN FIELD CONNECTOR KIT, ADB-ALNACO, Inc.
P/N 94A0017 -1 (L-880).
-2 (L-881)

		-1	-2
Frangible Coupling	52B0499	12 Reqd.	6
Flatwasher (Retaining)	66A0015-37	12 Reqd.	6
L-823 Female Connector	70A0048	12 Reqd.	6

FIGURE 8-25. PAPI CONDUIT CONNECTION (without L-867 Base)

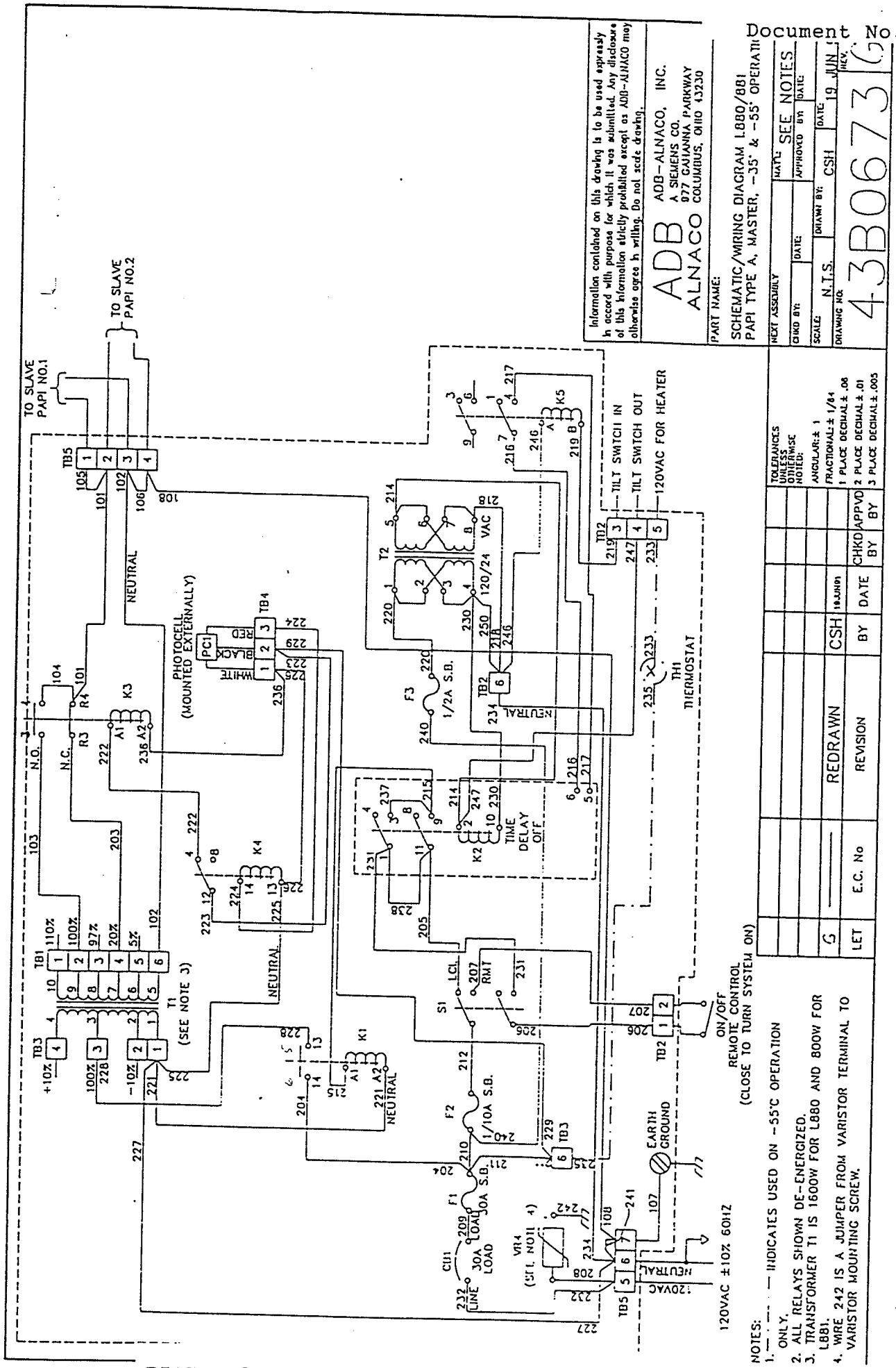


FIGURE 8-26. SCHEMATIC, L-880/L-881 MASTER

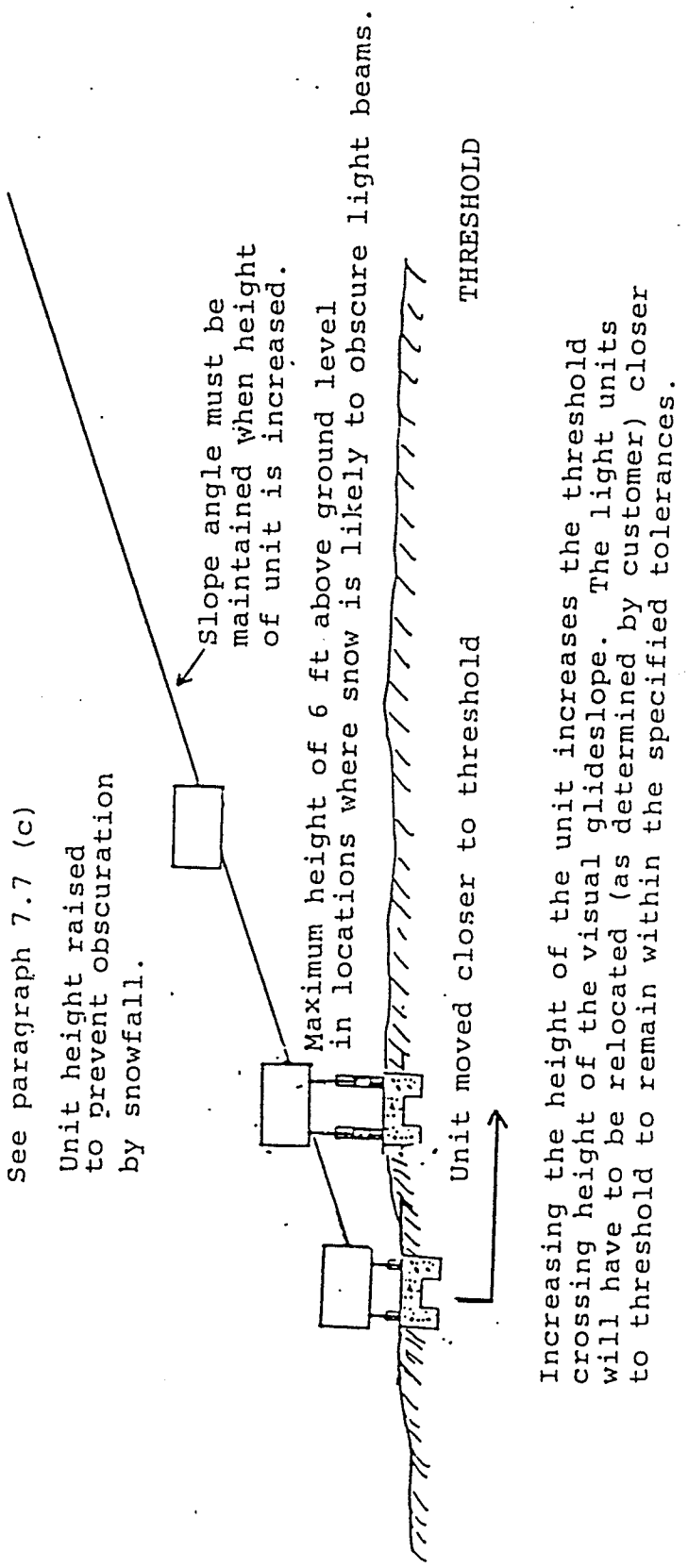
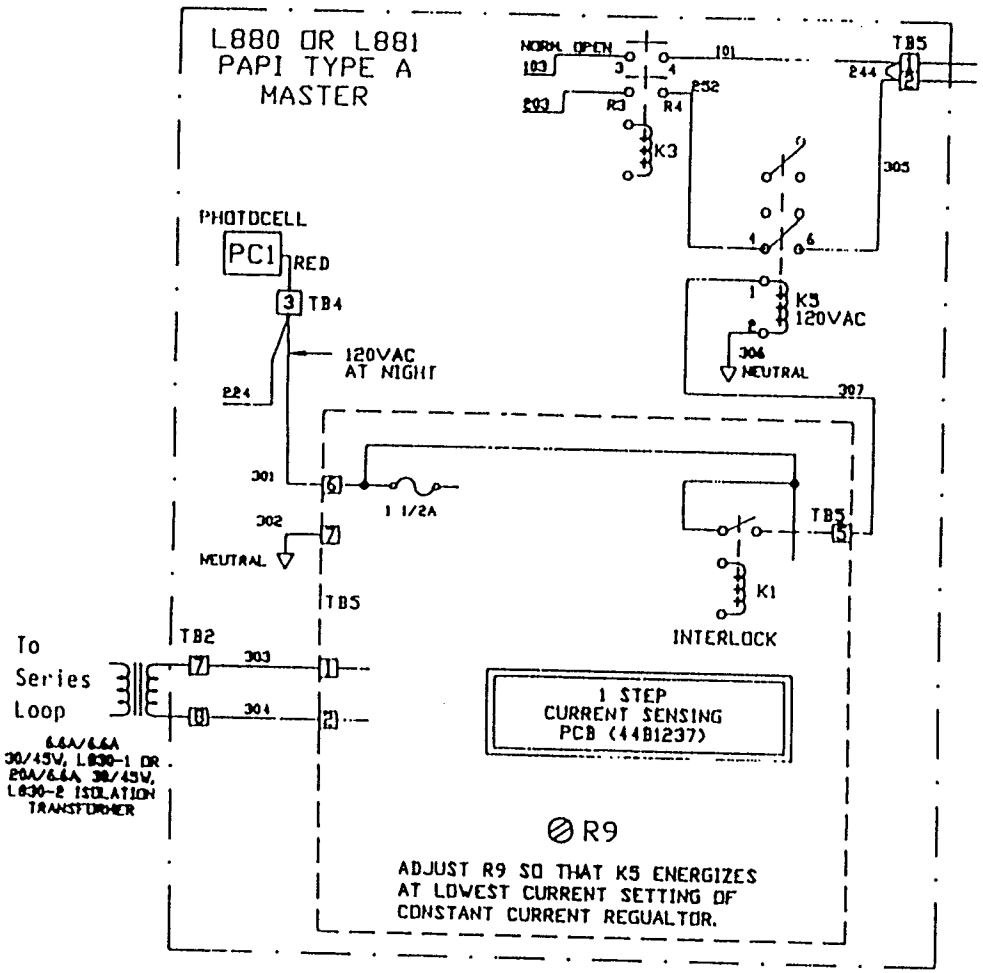


FIGURE 8-27. RELOCATING PAPI UNITS



WARNING

POWER IS ON IN THE MASTER
WHEN RUNWAY LIGHTS ARE OFF

THE INTERLOCK RELAY (K1 ON CURRENT SENSING PCB) WILL TURN THE PAPI ON ONLY WHEN THE RUNWAY LIGHTS ARE ON. DURING HOURS OF DARKNESS, THE PHOTOCELL PROVIDES 120VAC AT TB4-3. THIS 120VAC THEN POWERS THE CURRENT SENSING PCB VIA TB5-6. WHEN THE CURRENT IN THE RUNWAY LOOP HAS REACHED A CERTAIN LEVEL (ADJUSTED BY R9), INTERLOCK RELAY K1 IS ENERGIZED. THIS PROVIDES 120VAC TO K3 VIA TB5-5. WHEN K3 IS ENERGIZED, EITHER A 5% OR 20% VOLTAGE IS CONNECTED TO OUTPUT TERMINAL BLOCK TB5 1 AND 2.

THE PAPI WILL NOT TURN ON DURING HOURS OF DARKNESS UNLESS THE RUNWAY LIGHTS ARE ON AND AT THE PROPER LEVEL. THERE IS NO EFFECT ON DAYTIME OPERATION OF THE PAPI.

Note: Wire #101 is moved from R4 to 4 and wire #243 is deleted on standard PAPI Type A Master.

DO NOT SCALE DRAWING

ADB ALNACO
ADB-ALNACO, INC.
P.O. BOX 30829
977 GAHANNA PARKWAY
COLUMBUS, OHIO 43230

PART NAME:
SCHEMATIC, PAPI INTERLOCK

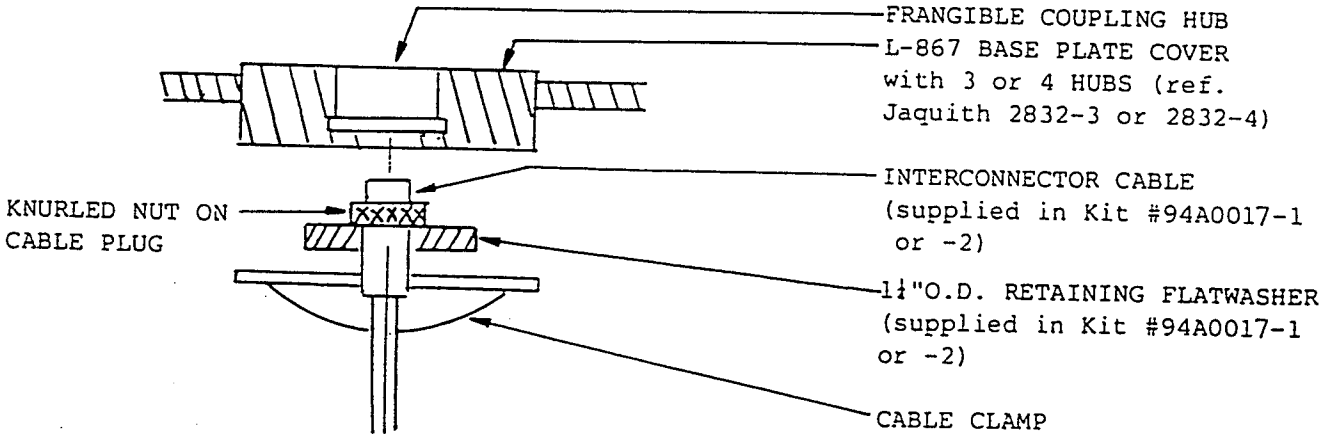
DRAWING NO: 43A0750

REV. A

FIGURE 8-28. OPTIONAL PAPI INTERLOCK SCHEMATIC

Cable Installation Using Retaining Washer

Note: Before routing interconnector cables, install 1¼ dia. retaining flatwasher (supplied in ADB-ALNACO Kit # 94A0017-1 or -2) onto cable and slide washer up against knurled nut located at the plug end of the cable. See figure below. After retaining flatwasher has been installed and cable has been spliced, cable is ready to attach to Jaquith base plate by installing cable clamp (supplied with base plate) around cable and sliding cable clamp up against retaining flatwasher and then attaching entire assembly to base plate. The retaining washer is required to prevent the cable plug from sliding through the cable clamp supplied with Jaquith base plate cover. The retaining washer is not required when an L-823 Style 8 receptacle is used. Do not use an L-823 Style 7 receptacle in installation, since this type of receptacle can not be secured to the base plate using the retaining washer or the cable clamp.



TYPICAL ASSEMBLY

FIGUE 8-29. TYPICAL CABLE ASSEMBLY USING RETAINING WASHER