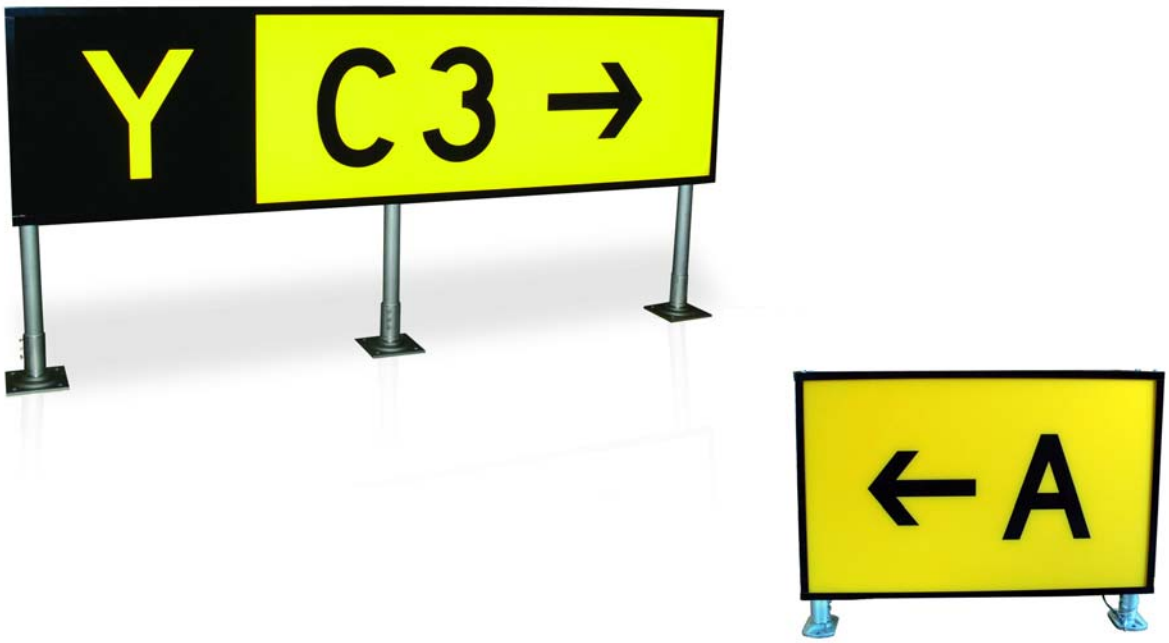

Solar LED L-858Y/R/L/B Signs

Light Bar Signs with SEPS Power

User Manual

96A0492, Rev. A, 9/8/17

ADB SAFEGATE

a.0 Disclaimer / Standard Warranty

a.1 CE certification

The equipment listed as CE certified means that the product complies with the essential requirements concerning safety and hygiene. The directives that have been taken into consideration in the design are available on written request to ADB SAFEGATE.

a.2 ETL certification

The equipment listed as ETL certified means that the product complies with the essential requirements concerning safety and FAA Airfield regulations. The directives that have been taken into consideration in the design are available on written request to ADB SAFEGATE.

a.3 LED Product Guarantee

Where applicable, per FAA EB67(applicable edition), ADB SAFEGATE L858(L) Airfield Guidance Signs are warranted against electrical defects in design or manufacture of the LED or LED specific circuitry for a period of 4 years. ADB SAFEGATE LED light fixtures (with the exception of obstruction lighting) are warranted against mechanical and physical defects in design or manufacture for a period of 12 months from date of installation; and are warranted against electrical defects in design or manufacture of the LED or LED specific circuitry for a period of 4 years per FAA EB67 (applicable edition).

NOTE: See your sales order contract for a complete warranty description. In some specific cases, deviations are (to be) accepted in the contract, which will supersede the standard warranty.

a.4 Standard Product Guarantee

Products of ADB SAFEGATE manufacture are guaranteed against mechanical, electrical, and physical defects (excluding lamps) which may occur during proper and normal use for a period of one year from the date of installation or 2 years from date of shipment and are guaranteed to be merchantable and fit for the ordinary purposes for which such products are made. ADB SAFEGATE L858 Airfield Guidance Signs are warranted against mechanical and physical defects in design or manufacture for a period of 2 years from date of installation per FAA AC 150/5345-44 (applicable edition).

NOTE: See your sales order contract for a complete warranty description.

a.5 All Products

LED Products of ADB SAFEGATE, manufactured and sold by ADB SAFEGATE or its licensed representatives, meets the corresponding requirements of FAA, ICAO and IEC.

ADB SAFEGATE will correct by repair or replacement per the applicable guarantee above, at its option, equipment or parts which fail because of mechanical, electrical or physical defects, provided that the goods have been properly handled and stored prior to installation, properly installed and properly operated after installation, and provided further that Buyer gives ADB SAFEGATE written notice of such defects after delivery of the goods to Buyer. Refer to the Safety section for more information on Material Handling Precautions and Storage precautions that must be followed.

ADB SAFEGATE reserves the right to examine goods upon which a claim is made. Said goods must be presented in the same condition as when the defect therein was discovered. ADB SAFEGATE furthers reserves the right to require the return of such goods to establish any claim.

ADB SAFEGATE's obligation under this guarantee is limited to making repair or replacement within a reasonable time after receipt of such written notice and does not include any other costs such as the cost of removal of defective part, installation of repaired product, labor or consequential damages of any kind, the exclusive remedy being to require such new parts to be furnished.

ADB SAFEGATE's liability under no circumstances will exceed the contract price of goods claimed to be defective. Any returns under this guarantee are to be on a transportation charges prepaid basis. For products not manufactured by, but sold by ADB SAFEGATE, warranty is limited to that extended by the original manufacturer.

This is ADB SAFEGATE's sole guarantee and warranty with respect to the goods; there are no express warranties or warranties of fitness for any particular purpose or any implied warranties of fitness for any particular purpose or any implied warranties other than those made expressly herein. All such warranties being expressly disclaimed.

a.6 Liability

WARNING

Use of the equipment in ways other than described in the catalogue leaflet and the manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in the manual.

ADB SAFEGATE cannot be held responsible for injuries or damages resulting from non-standard, unintended uses of its equipment. The equipment is designed and intended only for the purpose described in the manual. Uses not described in the manual are considered unintended uses and may result in serious personal injury, death or property damage.

Unintended uses includes the following actions:

- Making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine ADB SAFEGATE replacement parts or accessories.
- Failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards if not in contradiction with the general rules.
- Using materials or auxiliary equipment that are inappropriate or incompatible with your ADB SAFEGATE equipment.
- Allowing unskilled personnel to perform any task on or with the equipment.

a.7 © ADB SAFEGATE BVBA

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

TABLE OF CONTENTS

1.0 Safety

1.1 Introduction

This section contains general safety instructions for installing and using ADB Safegate, Americas equipment. Some safety instructions may not apply to the equipment in this manual. Task- and equipment-specific warnings are included in other sections of this manual where appropriate.

Carefully read and observe all safety instructions in this manual, which alert you to safety hazards and conditions that may result in personal injury, death or property and equipment damage and are accompanied by the symbol shown below.

1.2 To use this equipment safely:

WARNING

Read installation instructions in their entirety before starting installation.

- Refer to the FAA Advisory Circular AC 150/5340-26, Maintenance of Airport Visual Aids Facilities, for instructions on safety precautions.
- Observe all safety regulations.
- Become familiar with the general safety instructions in this section of the manual before installing, operating, maintaining or repairing this equipment.
- Read and carefully follow the instructions throughout this manual for performing specific tasks and working with specific equipment.
- Make this manual available to personnel installing, operating, maintaining or repairing this equipment.
- Follow all applicable safety procedures required by your company, industry standards and government or other regulatory agencies.
- Protect equipment with safety devices as specified by applicable safety regulations.

1.3 Additional Reference Materials:

- NFPA 70B, Electrical Equipment Maintenance
- NFPA 70E, Electrical Safety Requirements for Employee Workplaces
- ANSI/NFPA 79, Electrical Standards for Metalworking Machine Tools
- OSHA 29 CFR, Part 1910, Occupational Health and Safety Standards
- National and local electrical codes and standards.

1.4 Qualified Personnel

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

Always use required personal protective equipment (PPE) and follow safe electrical work practices. See 1.2 above.

1.5 Intended Use

WARNING

Using this equipment in ways other than described in this manual may result in personal injury, death or property and equipment damage. Use this equipment only as described in this manual.

ADB Safegate, Americas cannot be responsible for injuries or damages resulting from nonstandard, unintended applications of its equipment. This equipment is designed and intended only for the purpose described in this manual. Uses not described in this manual are considered unintended uses and may result in serious personal injury, death or property and equipment damage. Unintended uses may result from taking the following actions:

- Using materials or auxiliary equipment that are inappropriate or incompatible with ADB Safegate, Americas equipment
- Allowing unqualified personnel to perform any task

1.6 Storage

CAUTION

If equipment is to be stored prior to installation, it must be unboxed and set in a sunny area until needed.

Failure to follow this instruction can result in battery damage.

1.7 Operation

WARNING

- Only qualified personnel, physically capable of operating the equipment and with no impairments in their judgment or reaction times, should operate this equipment.
- Read all system component manuals before operating this equipment. A thorough understanding of system components and their operation will help you operate the system safely and efficiently.
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning.
- Never operate equipment with a known malfunction.
- Use this equipment only in the environments for which it is rated. Do not operate this equipment in humid, flammable, or explosive environments unless it has been rated for safe operation in these environments.
- Never touch exposed electrical connections on equipment while the power is ON.

1.8 Material Handling Precautions

CAUTION

This equipment may contain electrostatic sensitive devices.

- Protect from electrostatic discharge.
- Electronic modules and components should be touched only when this is unavoidable e.g. soldering, replacement.
- Electronic modules or components must not be brought in contact with highly insulating materials such as plastic sheets, synthetic fiber clothing. They must be laid down on conductive surfaces.
- The tip of the soldering iron must be grounded.
- Electronic modules and components must be stored and transported in conductive packing.

1.9 Action in the Event of a System or Component Malfunction

WARNING

- Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.

1.10 Maintenance and Repair

WARNING

Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.

- Only persons who are properly trained and familiar with ADB Safegate, Americas equipment are permitted to service this equipment.
- Always use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in your equipment manuals.
- Use only approved ADB Safegate, Americas replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.

2.0 Introduction

These signs are designed to guide pilots to a particular point on the field, identify holding positions, identify taxiway and runway intersections, and prohibit aircraft entry into designated areas.

2.1 Compliance with Standards

FAA:

Designed to meet L-858Y, L-858R L-858L and L-858B AC 150/5345-44 (Current Edition) and the FAA Engineering Brief No. 67 "Light Sources other than Incandescent and Xenon for Airport Lighting and Obstruction Lighting Fixtures."

CE:

Complies with the requirements of the EMC Directive 2004/108/EC

2.1.1 Uses

ADB Safegate's LED Solar Sign System (SSS) is an ideal choice for an airfield that requires improved safety measures, but experiences difficulties with grid access. ADB Safegate's SSS consists of an L-858Y, L-858R, L-858L, L-858B solar-powered sign (SS) and a Solar Engine Power Supply (SEPS). The SEPS incorporates the latest technology in solar technology, hardware and software to provide power and control to the SS.

- L-858Y SS: Direction, Destination, and Boundary (Informational Sign)
- L-858R SS: Mandatory Sign
- L-858L SS: Runway/Taxiway Location Sign
  These signs are designed to guide pilots to a particular point on the field, identify holding positions, identify taxiway and runway intersections, and prohibit aircraft entry into designated areas.
- L-858B SS: Runway Distance Remaining Sign
  The L-858B SS is used at 1,000-foot intervals adjacent to the runway edge in order to provide runway distance remaining information to pilots during takeoff and landing operations.

2.2 General Information

Table 1: Sign Legends

Type	Purpose	Legend Color	Background Color
L-858Y	Direction, Destination & Boundary	Black	Yellow
L-858R	Mandatory Sign	White with Black Outline	Red
L-858L	Runway/Taxiway Location	Yellow	Black
L-858B	Runway Distance Remaining	White	Black

2.2.1 Features

- Virtually eliminates runway shutdowns due to LED light source
- Direct replacement for existing sign
- Creates a highly uniform distribution of light, eliminating hot spots and shadows
- Operates on solar energy
- Eliminates re-lamping expenses and reduces on-going maintenance costs
- The SSS installs in minutes with no trenching, cabling, or external power, and can be relocated just as quickly.
- Battery daily depth of discharge is sized for a minimum of 5 years of service.
- Unprecedented reliability: microprocessor Energy Management System (EMS) monitors and adapts the brightness to environmental conditions for consistent operation and long life under the toughest conditions.
- The minimum autonomy or operational period without charging is 7 days.
- Protect personnel and assets: Optional hand-held wireless control allows for remote operation of a solar sign including mode changes for enhanced visibility in poor weather conditions
- Green solution: a clean, renewable and reliable energy source with the lightest environmental footprint.

2.2.2 Operating Conditions

Temperature: -40 °F to +131 °F (-40 °C to +55 °C)

Humidity: 0 to 100%

Wind: Mode 2 signs withstand wind velocities up to 225 mph

2.2.3 Construction

Corrosion-resistant sign construction requires minimal maintenance.

- Aluminum housing
- Acrylic sign legend panels
- Stainless steel hardware
- Retroreflective sheeting

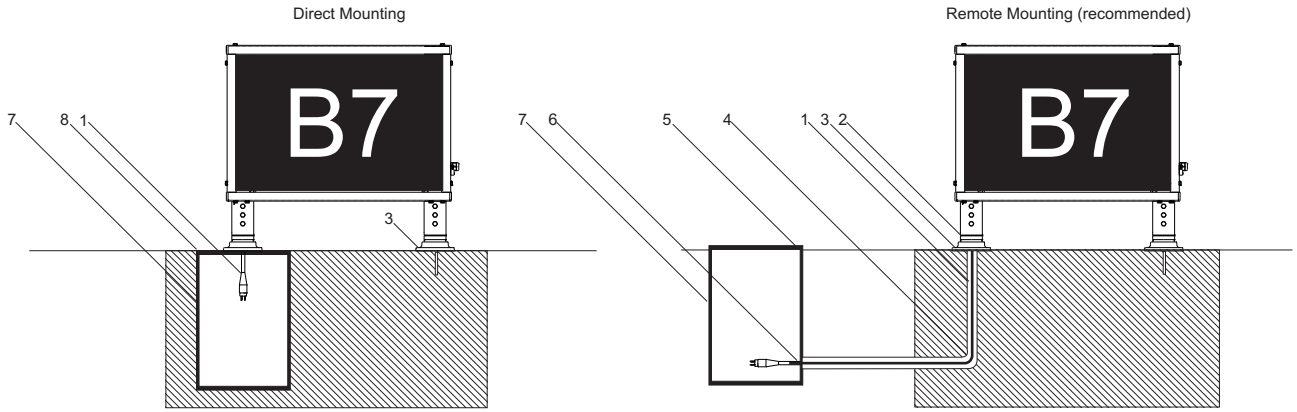
2.2.4 Installation

For a temporary application, the wiring between the SEPS and the SS can be above ground. Both the SS and SEPS contain side conduits for cabling access.

Each sign is furnished complete with mounting flanges for installation on a concrete pad, which is the recommended method of installation. Contact the ADB Safegate Sales Department for more information on sign installation hardware.

1. L-823 Cord Set (supplied with the sign)
2. Cable Clamp (supplied with the sign)
3. Floor Flange (supplied with the sign)
4. 2-inch Conduit Elbow (contractor supplied)
5. L-867 Blank Cover Plate with Gasket (purchased separately)
6. Cable from SEPS
7. L-867 Base (purchased separately)
8. L-867 Base Plate (special - purchased separately)

Figure 1: Direct/Remote Mounting



2.2.5 Solar Panel Orientation

Full solar exposure is critical to the performance of the SSS. Ensure that the SEPS installation location has year-round, unrestricted sun exposure throughout the day. The bottom edge of the solar panels should be installed at a minimum height to clear growing vegetation and snow at the site.

NOTE: Shading even a small portion of the solar panel will significantly reduce the output of the SSS.

2.3 Equipment Data

2.3.1 Solar Engine Power Supply (SEPS)

Table 2: Specifications

Installed weight	132 lb (59.8 kg)
Shipping weight	Box 1 (SEPS) - 76 lb (34.4 kg)
	Box 2 (battery) - 68 lb (30.8 kg)
Installed dimensions*	29.9 H x 42.9 W x 17.4 D in
	(75.9 H x 108.9 W x 44.1 D cm)
	* with wireless antenna at 55° tilt
Shipping dimensions	
Box 1 (SEPS)	25.5 H x 46.9 W x 14.0 D in
	(64.7 H x 119.1 W x 35.56 D cm)
Box 2 (battery)	8.3 H x 13.1 W x 7.4 D in
	(21 H x 33.2 W x 18.8 D cm)
Temperature	
Operating:	-22 °F to +122 °F (-30 °C to +50 °C)
Storage:	-40 °F to +176 °F (-40 °C to +80 °C)

Chassis	Weather and corrosion-resistant construction of stainless steel and powder coated aluminum
Mounting	ADB Safegate frangible couplings and floor flange mounts
Wind loading	300 mph min. installed at 55° tilt
Tilt	15°, 35°, 55°
Diagnostics	On-board feedback indicators for:
	Battery Status, System Status, Battery
	Reverse Polarity, and Solar Panel
	Reverse Polarity
Certifications	RoHS, WEEE, CE, FCC
Battery	
Power	12 VDC 105 A-hr at C/100 discharge rate
Type	Replaceable and recyclable, absorbent glass mat (AGM) SLA. Standard with one battery.
Lifetime	4,000 cycles to 20% depth of discharge at +68 °F
Charger	Temperature-compensated, maximum power point tracking (TC-MPPT)
LED Driver	
Power	
Channel A:	18 – 38 VDC from 0.3 – 1.4 A and
	5 – 100% duty cycle, constant current
Channel B:	18 – 38 VDC from 0.3 – 1.4 A and
	5 – 100% duty cycle, constant current
Automatic Light Control (ALC)	ALC dynamically reduces brightness in response to unusually low amounts of sunlight to ensure continued autonomous operation. Available on Channels A and B.
Control, Autonomous Mode	Dusk-to-dawn, steady on
Load Cabling	22 ft. (6.7 m) cable can exit onto the surface or down into a ground pot
PV Panel (	
Power	17 VDC, 95 W
Type	High Efficiency Monocrystalline, IEC 61215

Lifetime	10 years at 90% output
Wireless	
Range	2.5 miles minimum with 1 W wireless hand-held controller
Frequency	900 MHz ISM Band (902 – 928 MHz), FHSS
Encryption	256-bit AES

Control, On-demand Mode	Seamless integration with existing ADB Safegate wireless solar products.
	Up to 8 independent groups.
	Flash Mode, Emergency Mode, Autonomous Mode
	On-demand Temporary Mode (High, Medium, and Low)
	Configuration Mode, ARCAL

2.3.2 Sign Dimensions

Table 3: Sign Heights

Type	Sign Size No.	Sign Face Height	Legend Height	Overall Mounting Height
L-858Y/R/L	1	18″ (45.7 cm)	12″ (30.5 cm)	29.7″ (75.5 cm)
L-858Y/R/L	2	24″ (61 cm)	15″ (38.1)	35.7″ (90.8 cm)
L-858Y/R/L	3	30″ (76.2 cm)	18″ (45.7 cm)	41.7″ (106 cm)
L-858B	4	48″ (122 cm)	40″ (101.6 cm)	58.2″ (147.8 cm)
L-858B	5	30″ (76.2 cm)	25″ (63.5 cm)	41.7″ (106 cm)

Table 4: Sign Lengths

Size No.	1 Module	2 Module
1	29.4″ (75 cm)	58.6″ (149 cm)
2	35.9″ (91 cm)	71.6″ (182 cm)
3	42.4″ (108 cm)	84.6″ (215 cm)
4	47.9″ (122 cm)	N/A
5	42.4″ (108 cm)	N/A

Note: Sign depth is 9.39 in (23.85 cm).

2.3.3 Packaging Data

Signs are shipped with L-823 cord set(s), frangible couplings, and floor flanges-–ready for installation.

Table 5: Packaging Dimensions and Weights

	Gross Weight[1]		Carton Dimensions	
Description	(lb)	(kg)	(in)	(cm)
Size 1, Module 1	46	21	34 x 34 x 13	87 x 86.4 x 33
Size 1, Module 2	78	35	34 x 63 x 13	87 x 160 x 33
Size 2, Module 1	71	32	40 x 40 x 13	102 x 102 x 33
Size 2, Module 2	104	47	40 x 76 x 13	102 x 193 x 33
Size 3, Module 1	81	37	46 x 46 x 13	117 x 117 x 33
Size 3, Module 2	131	60	46 x 89 x 13	117 x 226 x 33
Size 4, Module 1	120	561	62 x 52 x 13	158 x 132 x 33
Size 5, Module 1	85	39	46 x 46 x 13	117 x 117 x 33

[1] Estimated weight

2.4 Wireless Hand-Held Controller

SEPS can be controlled using the Wireless Hand-Held Controller in a similar manner to ADB Safegate's wireless solar lights.

One or more wireless solar lights can be remotely operated from the ground or air with a hand-held wire-less controller using a secure radio transceiver with antenna and keypad.

The hand-held remote control option allows the user to temporarily override the intensity set in the autonomous modes. In temporary mode, 10%, 30% and 100%
intensities can be selected for a 15-minute Time-Out or a Maximum Time-Out.

The 15-minute Time-Out option is for only momentary intensity brightness operations of the SSS for airports that actively manage their airfields. After 15 minutes, the SSS will be return to the autonomous configuration.

The Maximum Time-Out option is for airports that require "the most intensity for as long as possible." The SEPS software prevents the battery from being ON indefinitely at the chosen intensity, thereby preventing battery full discharge. To determine the maximum activation time for each selected intensity and region, see Table 1.

2.4.1 Features

- Water-resistant keypad and LED indicators
- Utilizes a secure wireless RF signal
- Control range of up to 2.5 miles
- Meets MIL-SPEC-810E environmental requirements
- 24-hour operation on a single charge
- Rechargeable lithium-ion battery (included); recharges via an AC/DC wall plug (included)
- Compatible with stand-alone aviation band VHF receiver
- Comes complete in a custom Pelican™ case

2.5 Solar Regions

Table 6: Maximum Activation Time for Selected Intensity and Region

SSS	Region	On-Demand Activation Time per Day, 100% Intensity (meets FAA photometrics)	On-Demand Activation Time per Day, 30% Intensity	On-Demand Activation Time per Day, 10% Intensity
Size 1,2,3,5 1 Module	1	4 hrs	12 hrs	24 hrs
	2	4 hrs	14 hrs	24 hrs
	3	6 hrs	18 hrs	24 hrs
	4	6 hrs	20 hrs	24 hrs
	5	6 hrs	22 hrs	24 hrs
Size 4 1 Module	1	2 hrs	6 hrs	18 hrs
	2	2 hrs	7 hrs	22 hrs
Size 1,2,3 2 Modules	3	3 hrs	9 hrs	24 hrs
	4	3 hrs	10 hrs	24 hrs
	5	3 hrs	11 hrs	24 hrs

Table 7: Autonomous Settings by Solar Region

SSS	Region	Autonomous Dusk-to-Dawn % Intensity
Size 1,2,3,5 1 Module	1	22%
	2	30%
	3	36%
	4	50%
	5	64%
Size 4 1 Module	1	11%
	2	15%
Size 1,2,3 2 Modules	3	18%
	4	25%
	5	32%

Note: See catalog sheet 3036 in the Solar Product Center on our website for solar region maps in full color. If solar region is unclear, please contact the ADB Safegate Sales Department.

2.5.1 Solar Panel Orientation

Full solar exposure is critical to the performance of the SWCS. Ensure that the SEPS installation location has year-round, unrestricted sun exposure throughout the day. The bottom edge of the solar panels should be installed at a minimum height to clear growing vegetation and snow at the site.

NOTE: Shading even a small portion of the solar panel will significantly reduce the output of the SWCS.

2.5.2 Theory of Operation

The ADB Safegate SEPS is factory configured to work autonomously for either dusk-to-dawn or for 24-hour period operation. On autonomous mode the product turns on at the intensity that is sustainable in that solar region. See Table 8 and Figure 2 for % intensity by solar region.

SEPS has the option to be controlled remotely with a Hand Held Radio Control. The wireless handheld controller allows for intensity adjustment, some configuring, and grouping of loads. One of the benefits of radio controller is that the user can temporary override the autonomous intensity factory settings. However there is a limitation on the amount of hours the SRGLS can operate at different intensities.

SEPS can be controlled using the Wireless Hand-Held Controller in a similar manner to ADB Safegate's wireless solar lights.

One or more wireless solar lights can be remotely operated from the ground or air with a hand-held wireless controller using a secure radio transceiver with antenna and keypad.

The hand-held remote control option allows the user to temporarily override the intensity set in the autonomous modes. In temporary mode, 10%, 30%, 100% intensities can be selected for a 15 minute Time-Out or a maximum Time-Out.

The 15-minute Time-Out option is for only momentary intensity brightness operations of the SRGLS for airports that actively manage their airfields. After 15 minutes, the SRGLS will be return to the autonomous configuration.

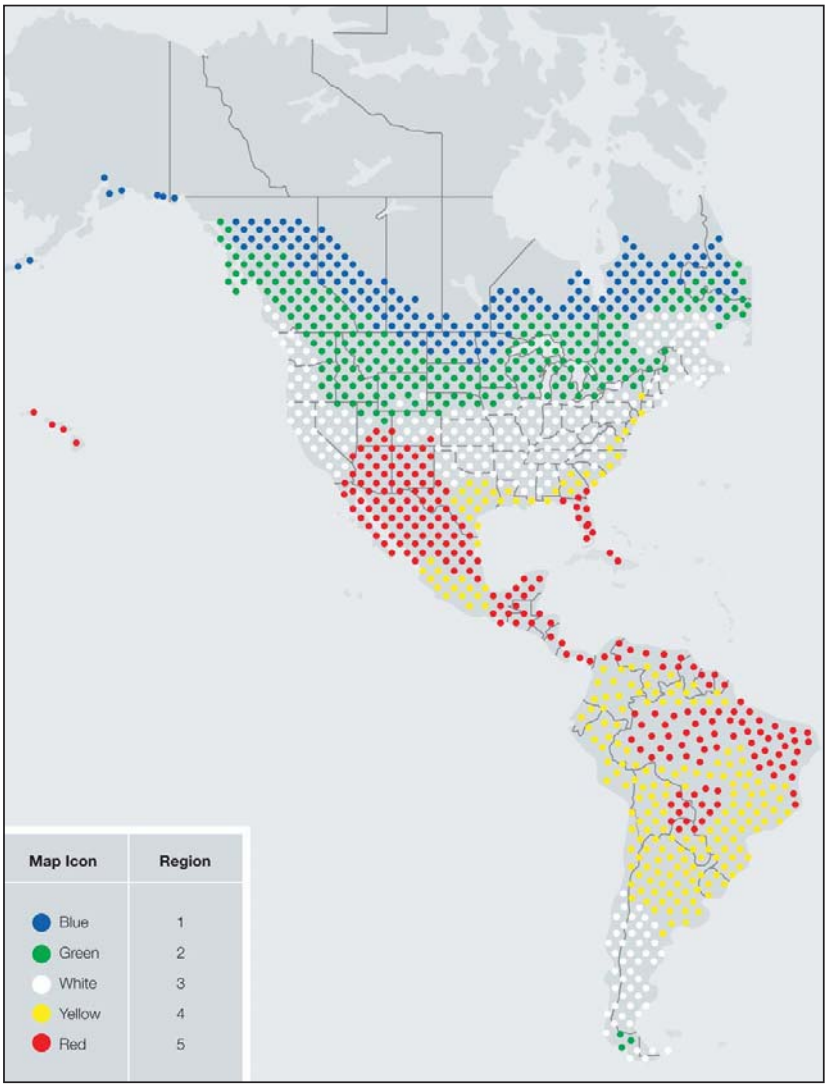
The maximum Time-Out option is for airports that require "the most intensity for as long as possible". The SEPS software prevents the battery from being ON indefinitely at the chosen intensity, thereby preventing battery full discharge. To determine the maximum activation time for each selected intensity and region, See Table 8.

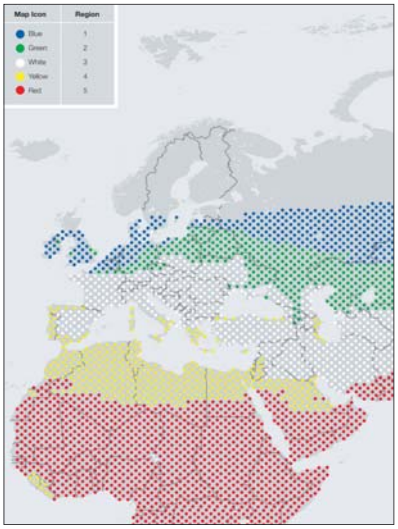
The minimum autonomy or operational days without charging is 7 days and the battery daily depth of discharge is sized for a minimum of 5 years of service.

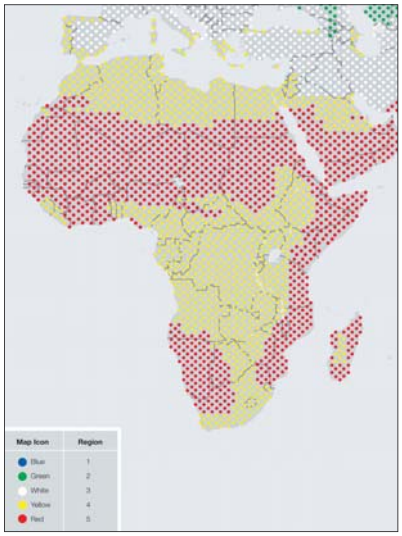
WARNING

Continuous selection of the temporary mode will exceed the maximum allocated time period of operation in table 2, and will cause the battery to drain.

Figure 2: Solar Region Map







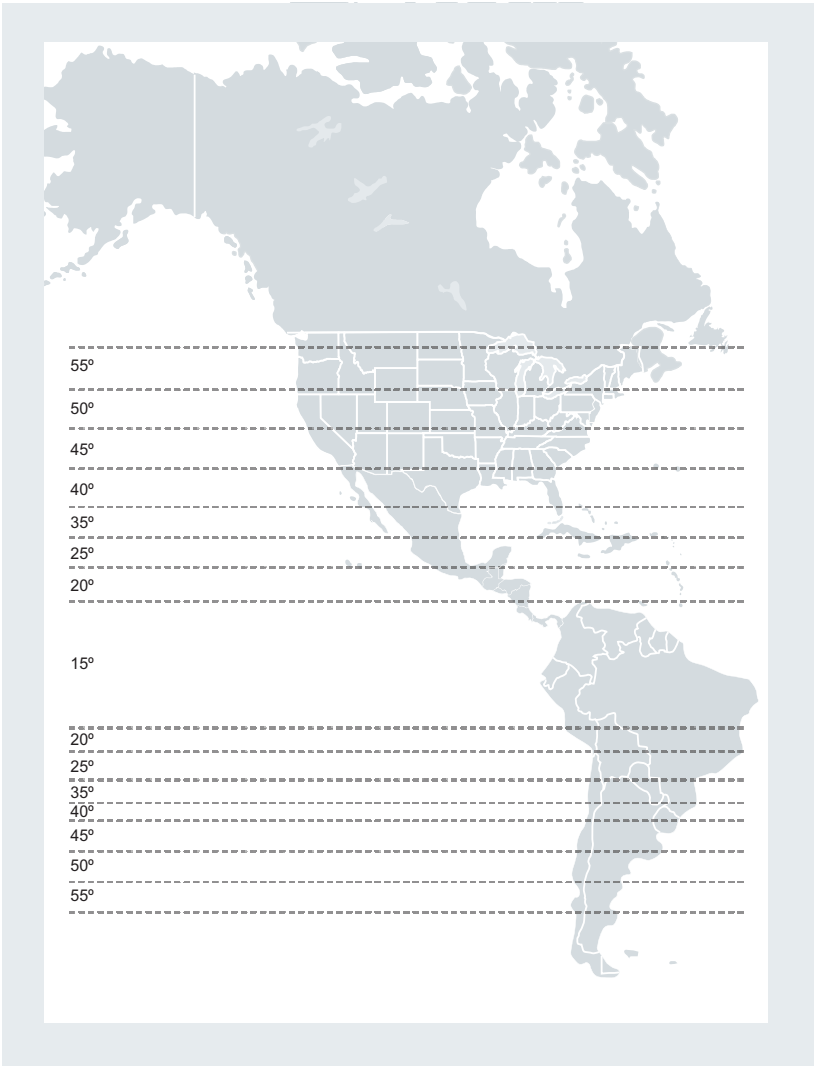
From: Cat Sheet 3036

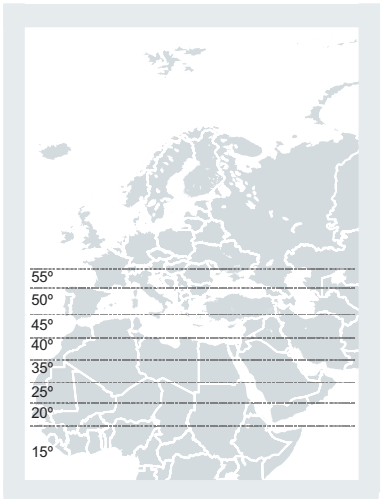
Table 8: Percent % Intensity per region in Autonomous mode

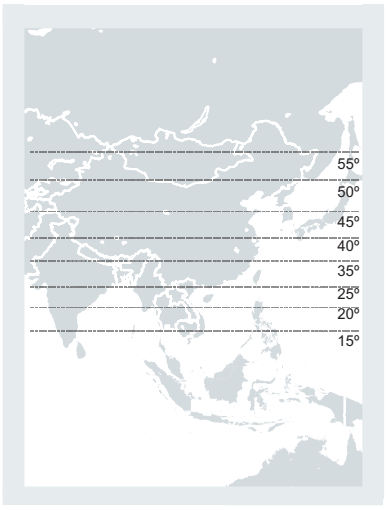
REGION		Autonomous Dusk-to-Dawn % Intensity	Autonomous 24Hr % Intensity
1		73%	49%
2		94%	60%
3		100%	70%
4		100%	82%
5		100%	92%

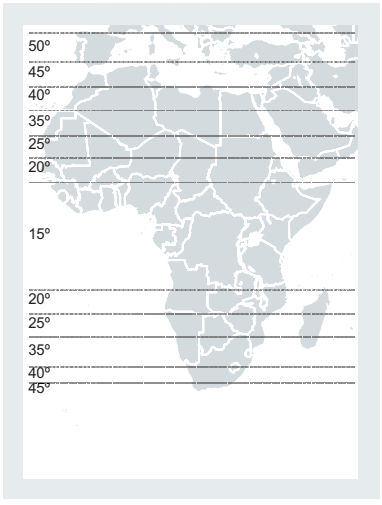
2.5.3 TILT ANGLES

Figure 3: Solar Tilt Angle Chart









NOTE: See Solar Map to select your region.

3.0 Installation

WARNING

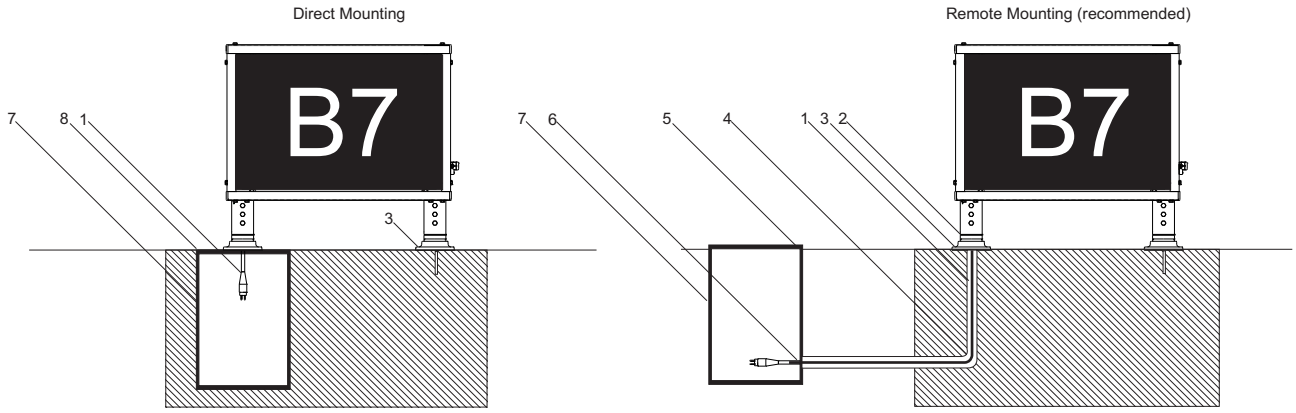
Read installation instructions in their entirety before starting installation.

- Refer to the FAA Advisory Circular AC 150/5340-26, Maintenance of Airport Visual Aids Facilities, for instructions on safety precautions.
- Observe all safety regulations. To avoid injuries, always disconnect power before making any wiring connections or touching any parts. Refer to FAA Advisory Circular AC 150/5340-26.
- Sign installation requires a flat mounting surface and the sign to be level to prevent legend panels from becoming distorted.
- Failure to install and level sign per the instruction manual will void the warranty

Each sign is furnished complete with mounting flanges for installation on a concrete pad, which is the recommended method of installation. Contact the ADB Sales Department for more information on sign installation hardware.

1. L-823 Cord Set (supplied with the sign)
2. Cable Clamp (supplied with the sign)
3. Floor Flange (supplied with the sign)
4. 2-inch Conduit Elbow (contractor supplied)
5. L-867 Blank Cover Plate with Gasket (purchased separately)
6. L-823 Extension Cord (purchased separately)
7. L-867 Base (purchased separately)
8. L-867 Base Plate (special - purchased separately)

Figure 4: Direct/Remote Mounting



This section provides instructions for installing L-858 taxiway and runway signs. Refer to the airport project plans and specifications for the specific installation instructions and FAA AC 150/5340-18.

3.1 Unpacking

The equipment is shipped ready for installation. Handle equipment very carefully to prevent component damage. Unpack the carton upon receipt and check the contents and their condition. Note any exterior damage to the carton that might lead to detection of equipment damage.

If you note any damage to any equipment, file a claim with the carrier immediately. The carrier may need to inspect the equipment.

3.2 Cord Set Installation

This subsection provides information for installing cord sets. It includes sign installation kit reference numbers for three power leg cord set installation locations and mounting configurations.

This subsection provides special cord set locations with parts and part numbers. See Figure 5 for the ordering code for the L-858 sign. Special cords set installation reference numbers are located in the ordering code.

3.2.1 Cord Set Installation Reference Number

3.2.1.1 Cord Set Exit Location #1

Figure 5 shows cord set location #1. Refer to Table 9 for cord set location #1 parts and part numbers.

Figure 5: Cord set Location #1 (Non-typical)

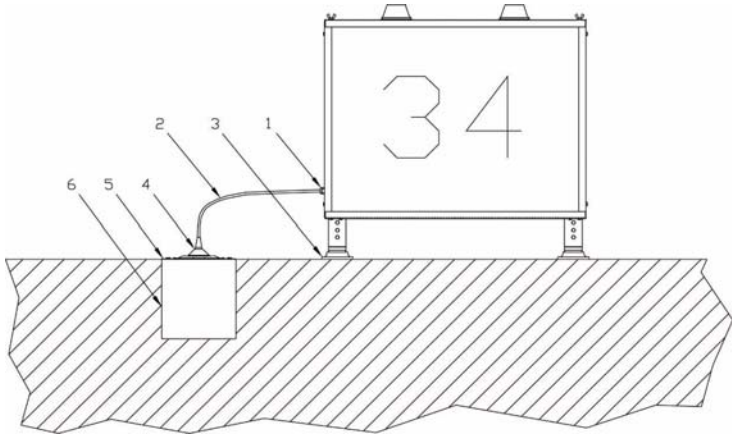


Table 9: Cord set Location #1 Parts

Item	Description	Supplier	Part Number	Note
1	Strain relief	ADB Safegate, Americas	77A0156	A
2	Cord set 16/2 SOW 600 V	ADB Safegate, Americas	Supplied with sign	B
3	Base flange	ADB Safegate, Americas	62A2142 or 62A2146	A
4	Connector plug	ADB Safegate, Americas	63B0550	C
5	2-in. (50.8-mm) L-867 base plate	ADB Safegate, Americas	1932	C
6	12 x 24 in. (304.8 x 609.6 mm) L-867B base	ADB Safegate, Americas	2124	C

NOTE: A: Shown for reference only. Part supplied with sign.
B: Signs supplied with the following length external to the sign: Size 1 = 47 in. Size 2 = 41 in.
Size 3 = 35 in. Size 4 = 18 in. Size 5 = 35 in. Any other external length requires a separate line on the purchase order specifying the external length required.
C: Requires a separate line item on the purchase order.

3.2.1.2 Cord set Exit Location #2

Figure 6 shows cord set location #2. Refer to Table 10 for cord set location #2 parts and part numbers.

Figure 6: Cord set Location #2 (Non-typical)

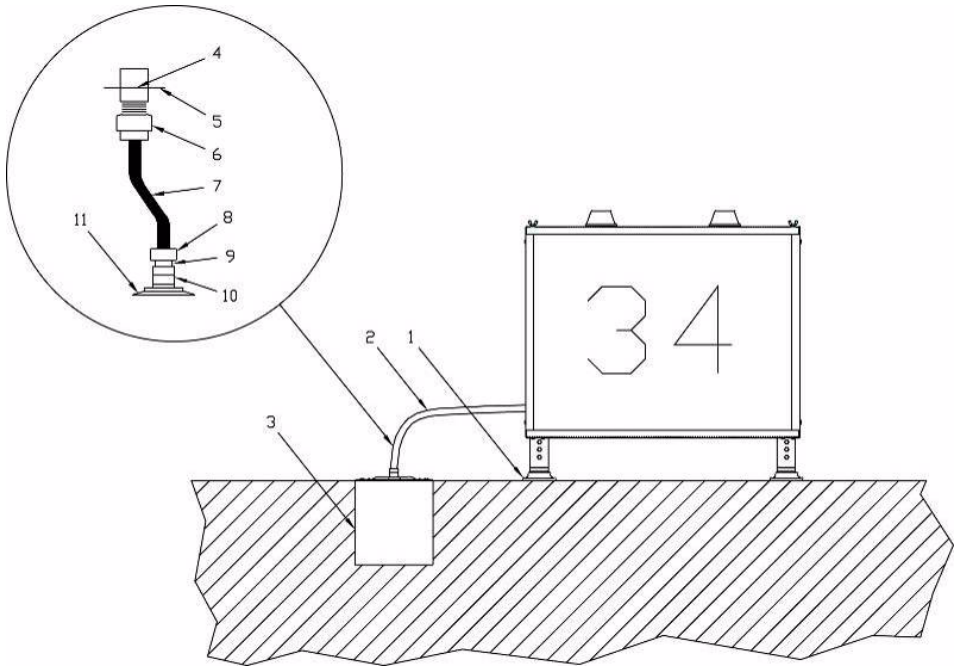


Table 10: Cord set Location #2 Parts

Item	Description	Supplier	Part Number	Note
1	Base flange	ADB Safegate, Americas	62A2142 or 62A2146	D
2	L-823 cord set 16/2 SOW 600 V	ADB Safegate, Americas	Supplied with sign	B
3	12 x 24 in. (304.8 x 609.6 mm) L-867B base	ADB Safegate, Americas	2124	C
7	Flexible conduit	Contractor	Not applicable	A
10	Frangible coupling	ADB Safegate, Americas	62B0499	C
11	2 in. (50.8 mm) L-867 base plate	ADB Safegate, Americas	1932	C

NOTE: A: Refer to Table 11 for flexible conduit connectors.
B: Signs supplied with the following length external to the sign: Size 1 = 47 in. Size 2 = 41 in. Size 3 = 35 in. Size 4 = 18 in. Size 5 = 35 in. Any other external length requires a separate line on the purchase order specifying the external length required.
C: Requires a separate line item on purchase order.
D: Shown for reference only. Part supplied with sign.

Table 11: Flexible Conduit Connectors

Item	Description	Supplier
4	3/4-inch (44.45 mm) diameter hole	ADB Safegate, Americas
6	1-1/4 inch (31.75 mm) flexible conduit male connector	Contractor
7	1-1/4 inch (31.75 mm) flexible conduit	Contractor
8	1-1/4 inch (31.75 mm) flexible conduit male connector	Contractor
9	1-1/2 x 1-1/4-in. (38.1 x 31.75-mm) hex reducer bushing	Contractor

3.2.1.3 Cord set Exit Location #3

Figure 7 shows cord set location #3. Refer to Table 12 for cord set location #3 parts and part numbers.

Figure 7: Cord set Location #3 (Standard)

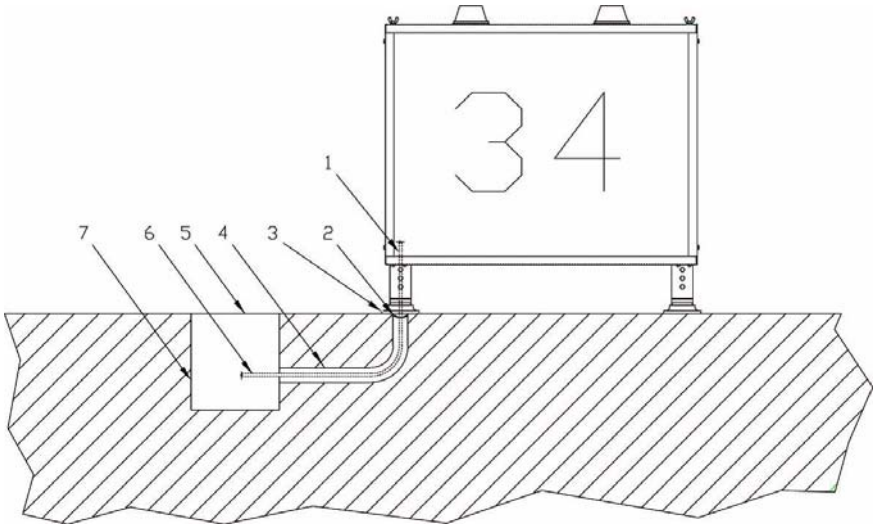


Table 12: Cord set Location #3 Parts

Item	Description	Supplier	Part Number	Note
1	Cord set 16/2 SOW 600 V	ADB Safegate, Americas	Not applicable	
2	Cable clamp	ADB Safegate, Americas	60A2851	B
3	Base flange	ADB Safegate, Americas	62A2142 or 62A2146	A
4	2-in. (50.8 mm) rigid conduit	ADB Safegate, Americas	Not applicable	
5	3/8 inch (9.53 mm) thick base plate	ADB Safegate, Americas	1000-6	
6	8-foot (2.44 m) extension cord	ADB Safegate, Americas	73A0109-8	C
7	12 x 24 in. (304.8 x 609.6 mm) L-867B base	ADB Safegate, Americas	2124	C
NS	Gasket	ADB Safegate, Americas	2052	B, D

NOTE: A: Shown for reference only. Part supplied with sign.
B: Requires a separate line item on purchase order.
C: Refer to *Cord sets and Extension Cords* in this section for extension cords available if different extension cord length is required.
D: Gasket is sold separately.

3.2.1.4 Cord set Exit Location #4

Figure 8 shows cord set location #4. Refer to Table 13 for cord set location #4 parts and part numbers.

Figure 8: Cord set Location #4 (Standard)

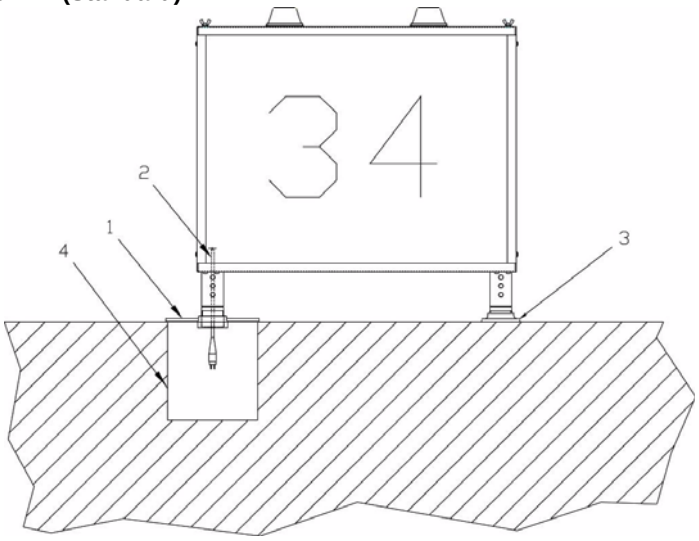


Table 13: Cord set Location #4 Parts

Item	Description	Supplier	Part Number	Note
1	12-inch heavy base plate, 2-1/2 NPT	ADB Safegate, Americas	1832-BSPLT	B
2	Cord set 16/2 SOW 600 V	ADB Safegate, Americas	73A0107/72	A
3	Base flange	ADB Safegate, Americas	62A2142 or 62A2146	A, C
4	12 x 24 in. (304 x 610 mm) L-867B base	ADB Safegate, Americas	2124	B

NOTE: A: Shown for reference only. Part supplied with sign.
B: Requires a separate line item on the purchase order.
C: Remove the base flange shipped with the sign when the leg is screwed into the base plate.

3.2.2 Cord set and Extension Cords

See Figure 9. Refer to Table 14 for cord set and extension cord types. Refer to Table 15 for cord set and cord parts.

Figure 9: L-823 Cord set and Extension Cords

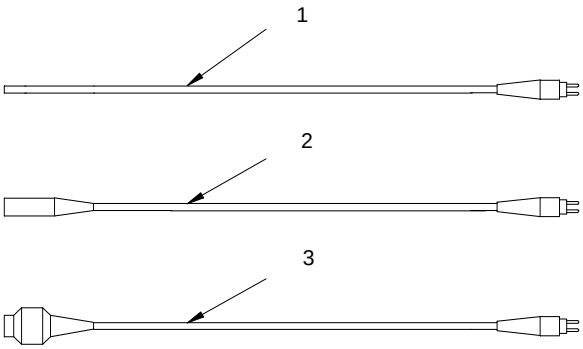


Table 14: Cord set and Extension Cord Length

Type	Part Number	Receptacle Style	Plug Style	Standard Length	Wire
1	73A0107-X	Not applicable	Type II, Class A, Style 1	4 ft. (1.22 mm) 6 ft. (1.83 mm)	16/2
2	73A0108-X	Type II, Class A, Style 7	Type II, Class A, Style 1	8 ft. (2.44 mm)	16/2
3	73A0109-X	Type II, Class A, Style 7	Type II, Class A, Style 1	8 ft. (2.44 mm)	16/2

Table 15: Cord set and Extension Cord Parts

Item	Description	Part Number	Note
1	L-823 cord set, 16/2 wire		A, B
	Cord set, standard size 4 ft. (1.22 mm)	73A0107-48	
	Cord set, standard size 6 ft. (1.83 mm)	73A0107-72	
2	L-823 cord set extension cord, 16/2 wire, standard size 8 ft. (2.44 mm)	73A0108-8	A, C
3	L-823 cord set extension cord, 16/2 wire, standard size 8 ft. (2.44 mm)	73A0109-8	A, D

NOTE: A: Other sizes require special order.
B: A minimum of thirty inches (762 mm) of cord set length is required for internal sign connections. Usable exterior cord set length is equal to the cord set length minus a minimum of 30 inches (varies with sign size and cord set exit location).
C: Receptacle may be connected to plug on 73A0107-X, 73A0109-8 cord set, or standard 31-inch (787.4 mm) L-823 cord set.
D: Receptacle must be connected to plug on, Plug Type II, Class A, and Style 1,
supplied with the sign.

3.3 General Guidelines

WARNING

- Signs must be grounded to a true earth ground. Failure to observe this warning may result in personal injury, death, or equipment damage.
- When installing signs, follow the guidelines covered in FAA AC 150/5340-30, Fig 126 for mounting pad design. Also see the following subsections for detailed information on sign pad and leveling of the sign.
- FAILURE TO INSTALL AND LEVEL THE SIGN AS DESCRIBED IN THE VARIOUS SUBSECTIONS BELOW WILL VOID THE WARRANTY

- Mount the signs on a concrete slab or concrete pedestals
- Do not allow concrete edges to protrude above grade.
- Provide power to the signs through breakaway cable connectors installed within the frangible coupling portion of the sign's mounting legs.
- Install auxiliary equipment, such as isolation transformers, in a light base embedded in the ground.

3.3.1 Overall Mounting Height

Install signs so that the overall height above the surrounding ground of the sign assembly, including mounting supports, does not exceed heights given in Table 3 and the clearances of aircraft wings as specified in AC 150/5340-18. The sign must provide 12 inches (304.8 mm) of clearance between the top of the sign and any part of the most critical aircraft using, or expected to use, the airport when the aircraft's wheels are at the pavement edge. For overall mounting height, refer to AC 150/5345-44.

3.3.2 Sign Orientation

When orienting signs follow the guidelines below

- Orient the sign so that the face is perpendicular to the centerline of the taxiway or runway.

NOTE: Check site plans and specifications for the location of the power leg (leg where the L-823 cord set is located) in reference to the L-867 light base. Typically, the L-867 light base is immediately under the power leg or is at the same end, but not under the power leg. ADB Safegate, Americas' signs are shipped with the sign product label attached to the sign end where the power leg is located. In addition, verify that the sign legend is orientated correctly to the taxiway or runway per the site plans when the sign is installed on the pad. If the sign legend location is not correct, then the panels must be removed and reinstalled in the sign in the correct location.

- For special situations refer to FAA AC 150/5340-18 for the correct orientation.

3.3.3 Sign Distance from Pavement Edge

Refer to Table 16 for the distance of signs from the pavement edge. Refer to AC 150/5340-18 for more information on the location of different types of taxiway signs.

Table 16: Recommended Sign Distance from Pavement Edge

Sign Size	Distance from Pavement (ft.)	Distance from Pavement (m)
1	10–20	3.1–6.1
2	25–35	7.6–10.7
3	35–60	10.7–18.2
4	50–75	15.2–22.9
5	20–35	6.1–10.7

3.3.4 Sign Installation on a Concrete Pad

NOTE: Follow site plans and specifications for concrete dimensions.

3.3.4.1 Concrete Pouring

See FAA AC 150/5340-30, Figure 126, for concrete base design.

To pour a concrete pad, perform the following procedure:

1. Determine the sign size and number of modules.
2. Pour your concrete pad according to the following requirements:

- A minimum of 30 inches (762 mm) wide, extending a minimum of 6 inches (152.4 mm) beyond the end of the supports. The sign pad needs to be flat and level in the area where the sign mounting flanges are located. See FAA AC 150/5345-30, Figure 126. The mounting floor flange is nominally 5.0 wide x 7.50 long and the area beyond the flange can be tapered to the outside edge of the concrete pad to provide for pad drainage.
- A minimum of 4 inches (101.6 mm) depth, extending below the frost line to prevent frost heave.
- Reinforce according to site plans and specifications.

3. Install a minimum of one 12-inch (304.8 mm) L-867B power base (1) according to the following guidelines:

- Install the base close to the sign in or near the concrete pad to provide easy access to the isolation transformer.

NOTE: When installing the base in the concrete pad, hold the L-867 base firmly in place during construction of the pad so that the upper surface of the base flange is level within ± 2 degrees and not more than 3/8 inch (9.525 mm) above the concrete surface.

- All other bearing surfaces on the pad for additional flange supports should be kept in the same horizontal plane as the L-867 base flange. The pad area where the sign mounting flanges will be located is to be flat **with no taper** to ensure that the sign will set level to prevent uneven loading on the frangible couplings. See FAA AC 150/5340-30, Figure 126 for pad design.
- For the Mode 2 and 3 signs

Before the concrete sets, install two 1/2–13 anchor bolts into the concrete pad. The bolt hole centerline is on a 6-inch diameter bolt circle, 180 degrees apart as shown. Bolt slots are 0.62-inches wide x 1.0 long.
Overall width of flange is 5.0 inches and overall length is 7.5 inches. Bolts should be located perpendicular to the sign face.

NOTE: A customer-supplied template is recommended to hold the bolts in position while the concrete sets. Anchor bolts (customer-supplied) must be a minimum of 1.25 inches (31.75 mm) above the top surface of the concrete pad to attach the mounting bases. Hilti Quick Bolts (wedge-bolt) or Red Head Trubolt Wedge Anchors are recommended for installing the flanges after the concrete sets (customer-supplied). Check with the manufacturer for their recommendations as applied to your airport site.

Example Hilti Kwik Bolt 3 Standard Thread 304 Stainless Steel

NOTE: With either anchoring system, the allowable load for any specific bolt is dependent upon several factors; type of concrete, depth of embedment, edge distance, anchor spacing, etc. ADB can advise the customer of various manufacturers of anchor bolts, but ADB cannot approve their specific installation.

Figure 10: Mode 2 and 3 Frangible Coupling for Size 1 Signs, Mode 2 Frangible Coupling for Size 2, 3, 4 and 5 Signs, Part number 62A2142

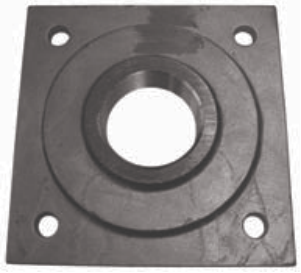
Figure 11: Mode 3 Frangible Coupling for Size 2, 3, 4 and 5, Hi Wind, Part Number 62A2146

5 5/8-inch Diameter Bolt Circle

2.5″ - 8 NPT (tapered)

Flange Thickness: 3/8″

Dimensions: 7 3/4″ x 7 3/4″



3.3.5 Sign Mounting

NOTE: Signs are totally assembled at the factory and are ready for direct installation. Mounting flanges may be removed to lubricate the threads of the frangible coupling with anti-seize compound before installing sign.

If male L-823 connector is routed through a leg, slide frangible coupling over male connector and insert into female connector in base plate, and then screw frangible coupling into base plate.

To mount the sign onto the concrete pad to insure the assembly is flat, perform the following procedure:

1. When the sign is ready to be bolted to the concrete pad set the sign assembly on the concrete pad and position the sign over the anchor bolts. Hand-tighten the bolts or nuts to fasten the mounting flanges to the concrete pad.
2. **To insure that the sign assembly is mounted flat on the concrete pad,** first loosen all three hex set screws found on each frangible coupling that are installed on the sign. See Figure 12. Once all the hex screws are loosened each of the sign legs will float free inside the frangible coupling that is screwed into the mounting flange Second, use a bubble, digital, or laser level to verify that the assembly is flat and level. Adjustments to make the assembly flat and level can be made by raising or lowering one end of the sign assembly to make the assembly flat and level.

NOTE: Once the assembly is flat it may be necessary to block-up or hold the assembly in the flat position until all of the hex set screws can be re-tightened on each of the frangible couplings to secure the sign leg to the coupling. Once the sign is flat and level finish tightening the mounting bolts to their correct torque value.

If the sign pad is tapered in the area when the mounting flanges are located shims may need to be placed under the mounting flanges to ensure that the coupling frangibility characteristics are the same for each coupling. If in doubt, contact ADB Safegate, Americas Engineering.

Figure 12: Sign Frangible Coupling

CAUTION

- Sign frangible couplings are uniquely designed for use on the sign size stamped on the coupling and can only be used for that particular size sign. If couplings must be replaced, make sure the sign size on the couplings matches the size sign on which they are to be installed.

3. Connect an AWG 12 (minimum) ground wire to the earth ground lug on the bottom of the sign.
4. Install optional tether. Refer to *Optional Tethers* in this section.
5. Plug the SEPS cord set into the sign.
6. Reinstall panels (if removed) and top lid (if removed).

3.4 SEPS Installation

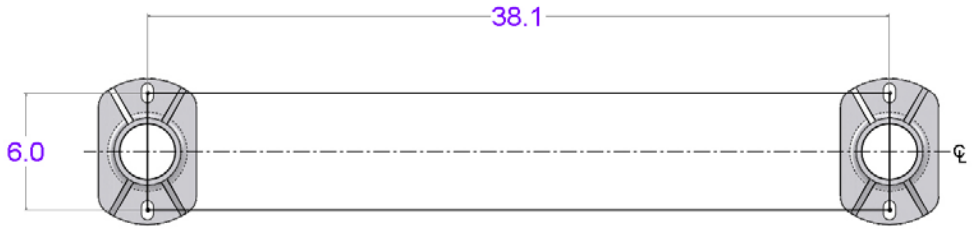
3.4.1 Site Preparation

Follow these steps to prepare the installation site:

1. Ensure that the site has year-round, unrestricted sun exposure throughout the day.

NOTE: Shading even a small portion of the solar panel will significantly reduce its ability to collect solar power.

2. Any pad design should meet FAA AC 150/5340-30:
    a. Above ground wiring: install a level concrete pad within 20 ft. of the load that SEPS will be powering. Mounting to wood, soil, or asphalt may work but is not recommended since they will not have the strength required for high wind loads.
    b. Below ground wiring: install a level concrete pad with L-867B base can and base plate or conduit within 20 ft. of the load that SEPS will be powering.
3. Use the below template (in inches) to mark 4 mounting points for the 2 floor flanges. Note that the centerline of SEPS should be parallel to the equator, so that the installed solar panel will face south in northern latitudes and north in southern latitudes.



4. At each of the 4 mounting points, install a ½-13 UNC anchor bolt or stud.

3.4.2 Assembly

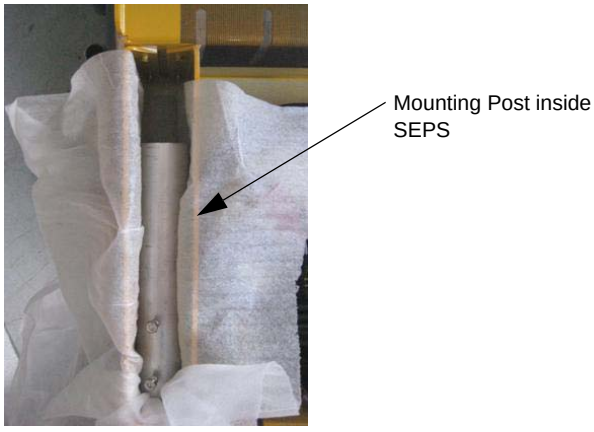
Follow these steps to assembly the SEPS:

1. Open SEPS's solar panel lid by loosening the 2 black, captive thumb screws under the bottom lip.

NOTE: Slowly hold and open the lid since it has a gas shock that will push the lid open.

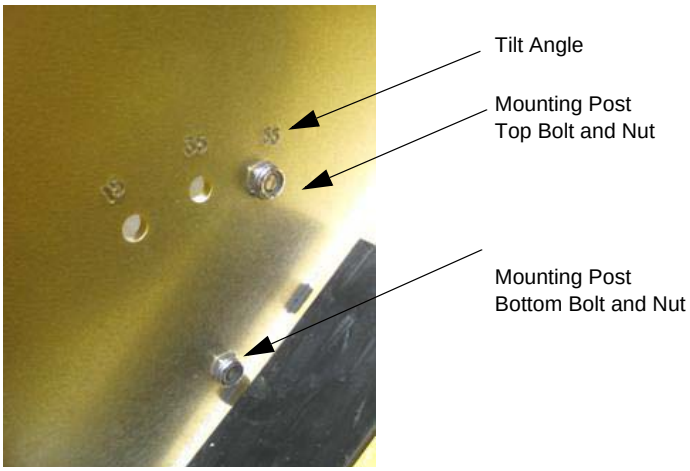
Lid is designed to best open and close once SEPS is fully installed and the lid can open quickly when SEPS is lying flat on the ground during preparation.

2. Unpack two mounting posts and their fasteners from within SEPS.

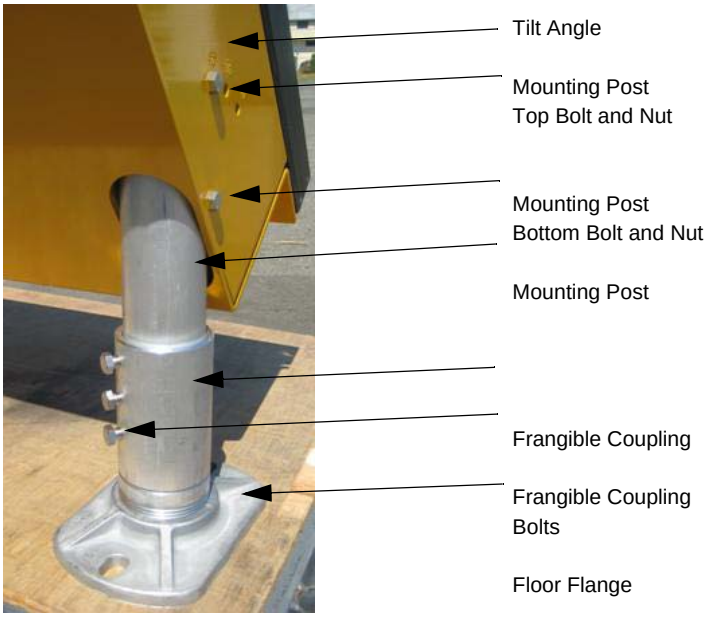


3. Slide the mounting post down its oblong hole. Align mounting post's bottom bolt hole with the bottom bolt hole in the chassis. Loosely install the 5/16-18 UNC bolt from the outside and the nut on the inside. Note that this bolt does not have extra length and when tightened will pull the chassis frame members together.

4. Tilt the mounting post to its desired tilt angle and install top bolt and nut. Tighten both top and bottom fasteners. Tilt angle is dependant on your location. See Figure 3.



5. Repeat above steps for second mounting post.
6. Close the lid and finger tighten the thumb screws to better balance the unit.
7. Thread the frangible coupling into the floor flange until tight. Install the frangible coupling's 3 bolts. Repeat for second subassembly.
8. Slide the frangible coupling subassembly onto the mounting post. Finger tighten 1 of the frangible coupling's screws to hold the subassembly onto the mounting post. Repeat for second subassembly.



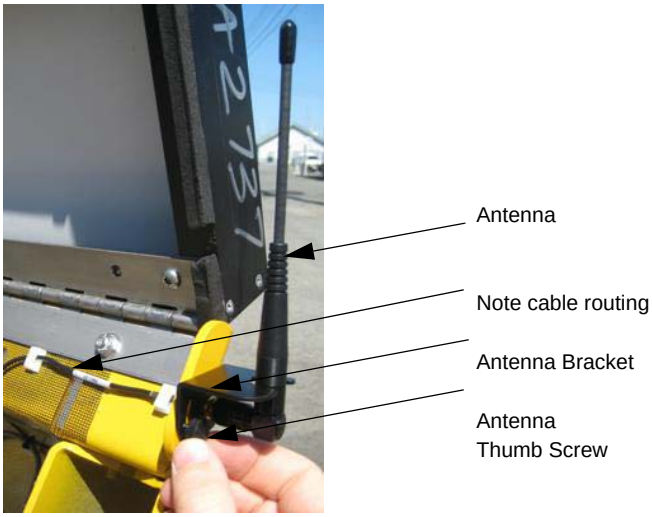
9. Pick up the SEPS and set down over the 4 anchor bolts installed above. If required, loosen frangible coupling bolts to adjust the rotation of frangible coupling. Do not loosen the floor flange and frangible coupling thread.
10. Tighten all frangible coupling bolts. Tighten all anchor bolts.

3.4.3 Antenna Assembly

If your SEPS has wireless control capability, it will have a wireless antenna subassembly that needs to be installed. During manufacturing, the antenna is uninstalled and placed inside SEPS to protect it from shipping damage. To install:

1. Open lid slowly and carefully unpack antenna subassembly.
2. Remove 8-32 UNC thumb screw and its toothed washer.
3. Slide antenna cable back through hole to remove slack.

4. Ensure antenna and bracket are vertical and re-install thumb screw and toothed washer.
5. Route cable as shown below.



3.4.4 Grounding

NOTE: Failure to install an appropriate grounding system may cause a safety risk in the event of lightning strike, electrostatic discharge (ESD), or damaged cabling.

Failure to install an appropriate grounding system will increase the risk of system damage in the event of lightning strike or ESD.

Surges resulting from lightning strikes in the proximity of the installation are one of the most common causes of solar system failure. Installation of an appropriate grounding system allows the static electricity that accumulates in the solar panel and mounting structure to discharge. In addition to preventing the attraction of lightning, a properly grounded installation may divert the surge associated with lightning from electrical circuitry, limiting the potential for damage.

SEPS is negatively grounded. The solar panel frame, solar panel negative terminal, battery negative terminal, chassis, and grounding lug are all electrically connected together.

SEPS should be grounded as follows:

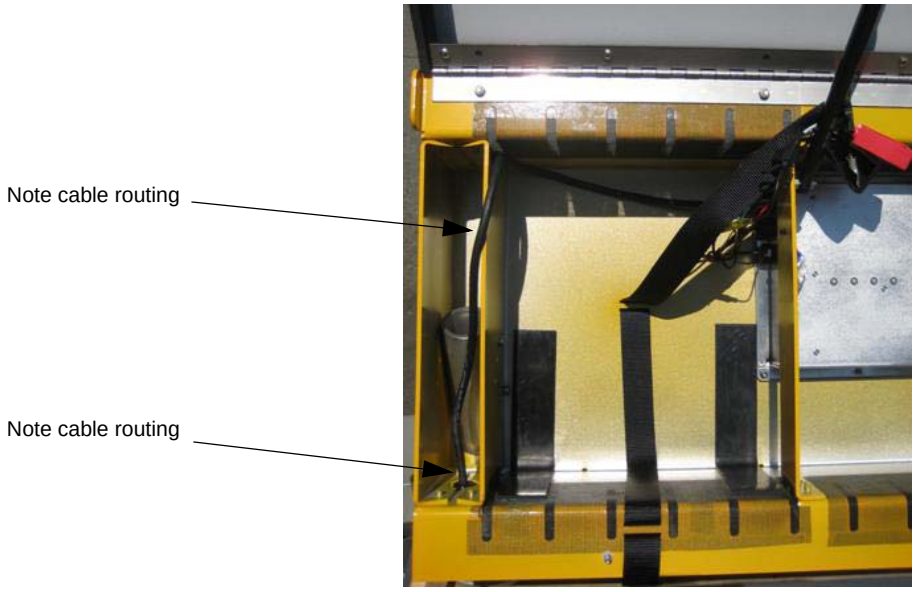
1. Install a 14 – 2 AWG stranded grounding wire (not included) into the grounding lug under the bottom lip of the chassis.
2. Connect the grounding wire to an appropriate grounding stake and install the stake in the ground.
3. Note that the load cable does not provide any grounding for the load. The load should also be properly grounded to prevent damage to it and SEPS.

Grounding techniques vary depending on site specifics and local electrical authorities. Consultation with a local grounding expert is recommended.

3.4.5 Connect Load

Connect the load to SEPS as follows:

1. Uncoil the load cable. The cable is stiff and should be routed above where the battery will be installed.
2. For installations with cabling going into the ground, feed the load cable down either mounting post. For a more finished look, the black, liquid tight cable fitting exiting the SEPS unit may be replaced with the included 7/8 in. hole plug.
3. For installations with cabling lying on the surface of the ground, feed the load cable out through the liquid tight cable fitting. Tighten fitting.



4. Pull the loose, 6 conductor end of the load cable into the appropriate junction box to connect to the load.
5. Connect the 6 conductors to the load as per the electrical load connection diagrams.

3.4.6 Install Battery

NOTE: Exercise caution when handling batteries. They are capable of generating enormous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, rings) before attempting to handle or remove the battery packs.

Be careful not to short battery terminals with tools.

Batteries are heavy. Ensure that you use proper lifting techniques when moving batteries.

Do not discard batteries in the garbage – please recycle!

These batteries are rechargeable lead-acid AGM batteries. Consult your local municipal by-laws for information on recycling the cells when replacing.

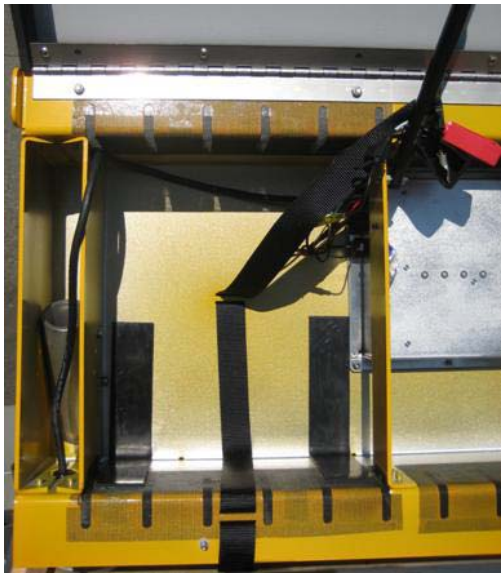
SEPS has the capability to accept 1 battery.

The battery must always be installed last, after site preparation, assembly, wireless assembly, grounding, and load connection. There is no switch to power up the system. Once the battery and its fuse are installed, SEPS's EMS turns on. The EMS will immediately attempt to charge the battery from the solar panel and perform a load scan to determine if any load is connected.

Battery 1 sits in the left hand cavity inside SEPS. To install battery 1:

1. Remove the battery fuse from the battery harness.
2. Release the battery strap buckle and loosen the buckle to the end of the strap.

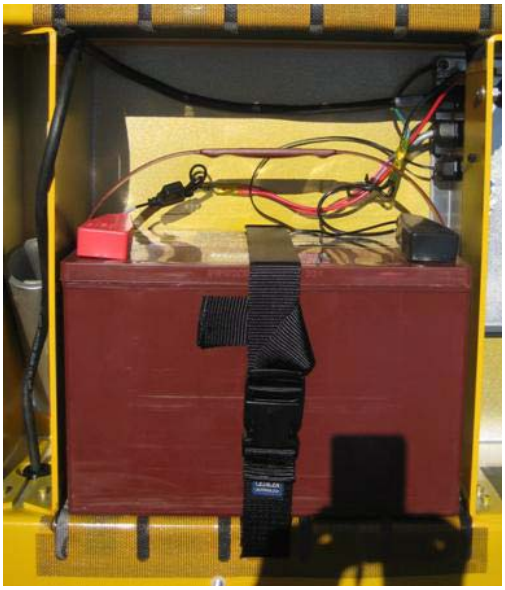
3. Loop the strap buckle, battery harness leads, and temperature sensor above the solar panel's gas shock and out of the way.



4. Balance the battery on the bottom lip of the SEPS chassis and then slowly let it drop back into its cavity. Do not let the battery fall backwards or crush any electrical connections.

5. Battery terminals should be closest to you, with the positive (+) on the left and negative (–) on the right.
6. Loop the battery strap under the battery handle. Connect the battery strap buckle. Tighten the battery strap and fold loose end underneath itself.
7. Loop the positive (+) harness lead under the battery handle. Apply anti-corrosion compound (not included) to the terminal. Connect the harness lead to the terminal and slide on the red, positive, battery terminal boot. Use supplied 5/16-18 UNC nut and lock washer.
8. Loop the negative (–) harness lead and its temperature sensor under the battery handle. Apply anti-corrosion compound (not included) to the terminal. Connect the harness lead first and then the temperature sensor to the terminal and slide on the black, negative, battery terminal boot. Use supplied 5/16-18 UNC nut and lock washer.

9. Install the battery fuse.



3.4.7 Wiring

Refer to the wiring diagrams.

When installing cable, follow the guidelines below.

- Install all cable for direct earth burial or for placement in conduit according to site plans.
- Operate, test the sign before closing up the enclosures.

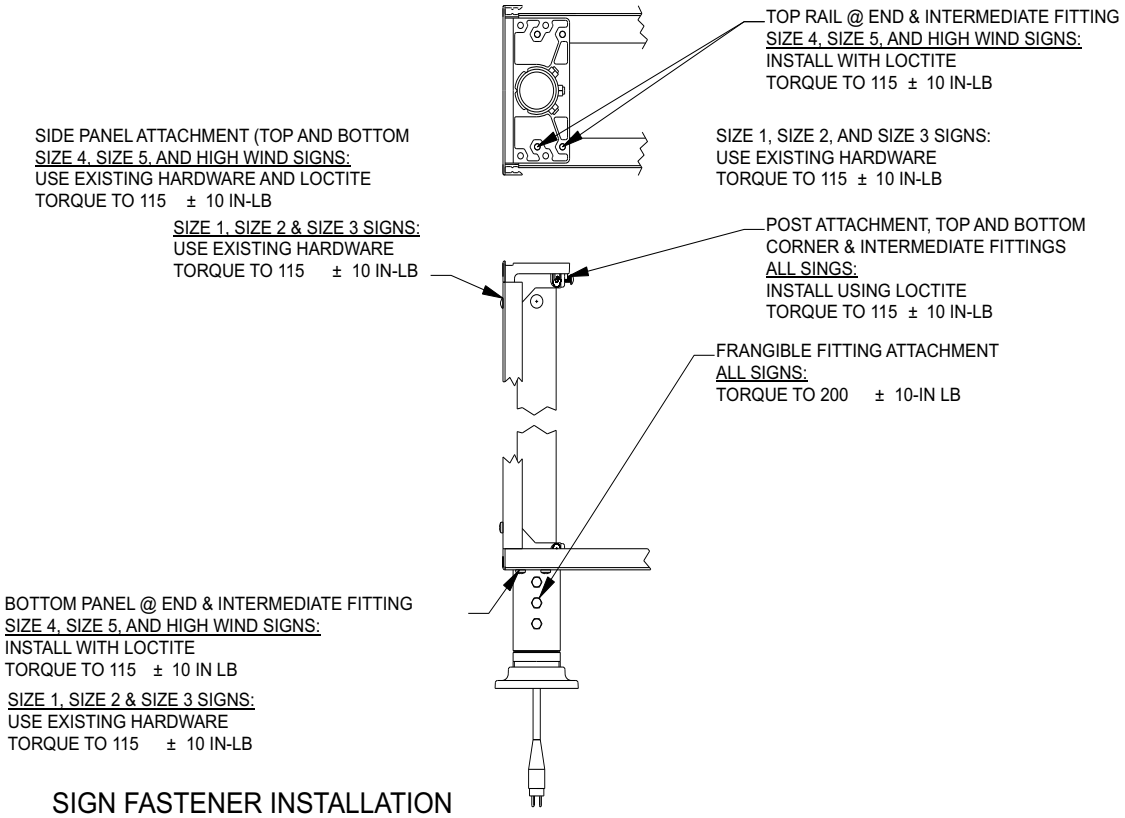
3.4.8 Earth Ground Lug

WARNING

- Signs must be properly grounded to true earth ground. Failure to observe this warning may result in personal injury, death, or equipment damage.

Attach the earth ground lug. The earth ground lug is located on the outside frame of the sign to permit easy connection of an AWG 12 (minimum) earth ground wire to the sign. If necessary, you may remove the ground lug from the outside and place it on the inside.

3.4.9 Sign Fastener Installation



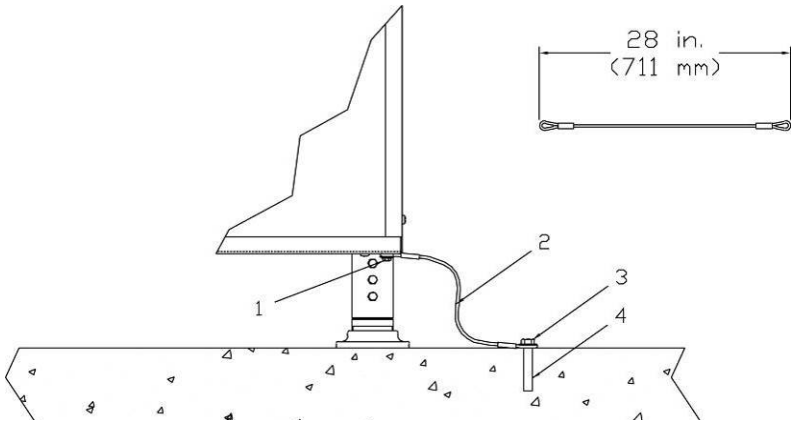
SIGN FASTENER INSTALLATION

3.4.10 Optional Tethers

See Figure 13. Tethers are shipped installed on the sign sales order. Location and quantity of the tether are determined when the sales order is placed.

NOTE: In the tether installation procedure below, the customer supplies the mounting hardware to attach one end of the tether to the concrete pad. The customer also supplies the expansion anchor for the bolt.

Figure 13: Installing Optional Tether



1. Existing 5/16-18 x ¾ in. Bolt
2. Tether
3. Mounting Hardware Attached to Expansion Anchor
4. Expansion Anchor for Bolt
5. To attach a tether, install the customer-supplied mounting hardware (3) to attach the tether to the expansion anchor (4) on the concrete pad

4.0 Maintenance and Repair

This section provides preventive maintenance for L-858 signs.

To keep the L-858 taxiway and runway signs operating efficiently, follow a preventive maintenance schedule. Refer to Table 17.

Table 17: L-858 Taxiway and Runway Sign Maintenance

Interval	Maintenance Task	Action
Daily	Check for burned-out LED assemblies.	Check circuit operation.
Monthly	Check for dirty panels.	Clean with mild soap and water.
	Check for vegetation covering panel.	Remove vegetation.
Semi-Annually	Check for loose wire connections.	Tighten wires.
	Check for cracked or deteriorated wires.	Replace wire.
Annually	Check for paint flaking off.	Repaint.
	Check for panels yellowing.	Clean with Formula 409 or similar cleaning agent.
	Check for deteriorated gaskets.	Replace gaskets.

4.1 Replacing an LED Light Bar

1. Turn off the power to the sign.
2. Remove the top cover.
3. Remove the sign face.
4. Disconnect the power connector from the LED light bar being replaced.
5. Drill out the pop rivets from light bar being replaced.
6. Note the orientation of light bar to be replaced in reference to the connectors.
7. Install the new light bar and replace the pop rivets

CAUTION

This equipment contains electrostatic sensitive devices.

- Protect the LED light bar kit from electrostatic discharge.
- Failure to secure light bar may result in equipment damage.

8. Check that all connections are tight and correct.
   See the LED light bar schematic diagram Figure 15 and Figure 15.
9. Replace the panels, top cover and restore the power to the sign.

Figure 14: Two Sizes of Light Bars

4.2 Batteries

NOTE: Exercise caution when handling batteries. They are capable of generating enormous short-circuit currents. Remove all jewelry (bracelets, metal-strap watches, rings) before attempting to handle or remove the battery packs.

Be careful not to short battery terminals with tools.

Batteries are heavy. Ensure that you use proper lifting techniques when moving batteries.

Do not discard batteries in the garbage – please recycle!

These batteries are rechargeable lead-acid AGM batteries. Consult your local municipal by-laws for information on recycling the cells when replacing.

Battery 1 sits in the left hand cavity inside SEPS. To replace battery 1:

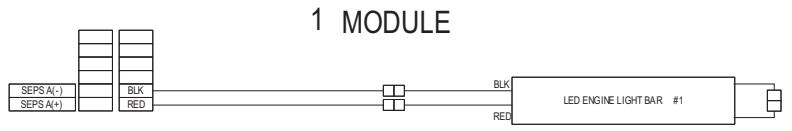
1. Remove the battery fuse from the battery harness.
2. Slide back the black, negative, battery terminal boot. Disconnect the negative (–) harness lead and the temperature sensor.
3. Slide back the red, positive, battery terminal boot. Disconnect the positive (+) harness lead.
4. Release the battery strap buckle and loosen the buckle to the end of the strap.
5. Loop the strap buckle, harness leads, and temperature sensor above the solar panel's gas shock and out of the way.
6. Pull on the battery's handle to lever the battery up onto the front sill of the SEPS chassis and away from the electrical connections on the EMS. Then, lift the old battery clear.
7. Balance the new battery on the bottom lip of the SEPS chassis and then slowly let it drop back into its cavity. Do not let the battery fall backwards or crush any electrical connections.
8. Battery terminals should be closest to you, with the positive (+) on the left and negative (–) on the right.
9. Loop the battery strap under the battery handle. Connect the battery strap buckle. Tighten the battery strap and fold loose end underneath itself.
10. Loop the positive (+) harness lead under the battery handle. Apply anti-corrosion compound (not included) to the terminal. Connect the harness lead to the terminal and slide on the red, positive, battery terminal boot.
11. Loop the negative (–) harness lead and its temperature sensor under the battery handle. Apply anti-corrosion compound (not included) to the terminal. Connect the harness lead and then the temperature sensor to the terminal and slide on the black, negative, battery terminal boot.
12. Install the battery fuse.

4.2.1 Energy Management System (EMS) Recycling

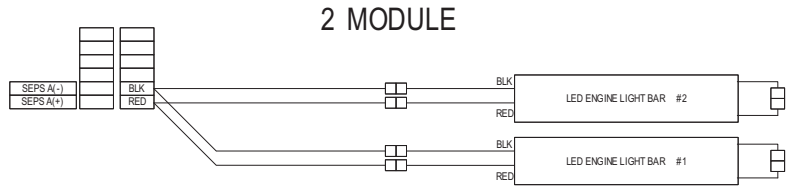
Production of the EMS required the extraction and use of natural resources. The EMS may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle the EMS in an appropriate way that will ensure most of the materials are reused or recycled appropriately. Check your local municipality for electronics recyclers.

The symbol indicates that this product complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE).

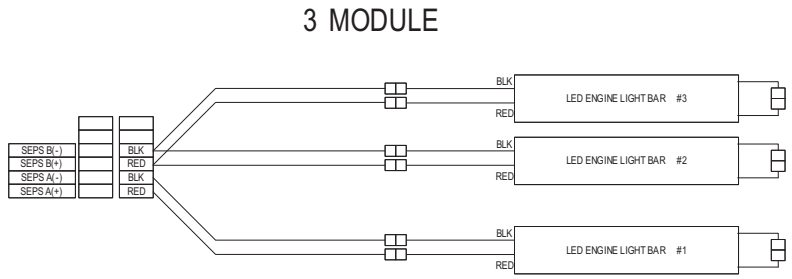
Figure 15: Wiring for Light Bar Signs



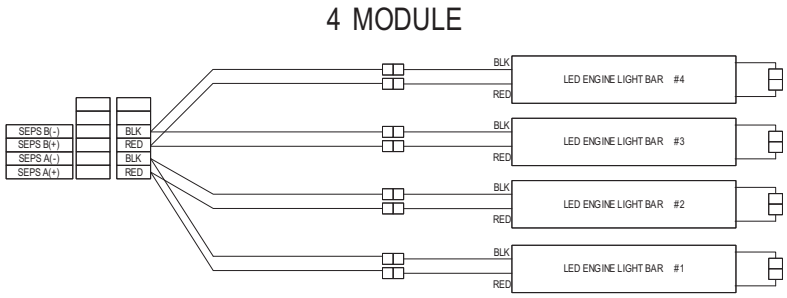
PROGRAM CHANNEL A FOR 440 MA OUTPUT



PROGRAM CHANNEL A FOR 880 MA OUTPUT



PROGRAM CHANNEL A FOR 440 MA OUTPUT
PROGRAM CHANNEL B FOR 880 MA OUTPUT



PROGRAM CHANNEL A FOR 880 MA OUTPUT
PROGRAM CHANNEL B FOR 880 MA OUTPUT

4.3 Troubleshooting

This section provides troubleshooting information for the L-858 taxiway and runway signs. The information covers only the most common problems. If you cannot solve the problem with the information given here, contact your local ADB Safegate, Americas representative for help.

Problem – LED Signs	Possible Cause	Corrective Action
All LEDs are out or not functioning correctly.	Loose wires or connections	Tighten or replace wires.
	Broken or disconnected wire at the Terminal Block	Check for loose or broken wires.
	LED Light Panel fault	Bypass one light at a time in the circuit to find the faulty unit. Replace the faulty unit.

Table 18: Troubleshooting the SEPS

Issue	Action
Load Appears Dim	If your system does not operate according to its specifications, the unit may be using Automatic Light Control (ALC). If the battery's state of charge drops below 66%, ALC engages and reduces the power output to protect the batteries under unusually poor solar conditions. If the Battery Status indicator is red or yellow, the battery is low on charge. The system will recover on its own.
	If the Battery Status indicator is blinking green, verify that the load is functional independent of SEPS. If not, verify correct wire polarity and electrical connections.
Load is Unexpectedly Blinking or System Status Indicator is Red	If the fixture is blinking once every 30 seconds, the product is in Low Voltage Discharge (LVD) mode. This indicates that the battery is at an extremely low state of charge and turns off the output power to the load. Ensure that the solar panel is not covered by debris or dirt, and that it is in the correct orientation (northern hemisphere solar panel faces south, southern hemisphere solar panel faces north). If required, remove the debris or clean the solar panel with a soft cloth and water. Wait at least 24 hours for the system to recover. If it does not recover, contact customer support.
	If the fixture is blinking twice every 30 seconds, the product is in 24 Hour Shutdown Mode. This mode turns on if the product does not discover any power coming from the solar panel for 24 hours. The product then interprets this as being indoors or inside packaging. Install product outside in good solar conditions. If it does not recover, contact customer support.
Reverse Polarity	If the Battery Reverse Polarity indicator is lit, switch the positive and negative terminals.
	If the Solar Panel Reverse Polarity indicator is lit, switch the positive and negative connectors.
No Response to Wireless Handheld Controller	If the balance of SEPS is checked to be operational (battery, fuse, load wiring, product orientation, indicators) and the product does not respond to commands from the wireless handheld controller, check:
	External antenna is connected and installed properly.
	Grouping of the loads. Check that you've selected the appropriate group when sending wireless commands. When in doubt, select all groups when sending commands from the wireless handheld controller.
	Ensure that both the antenna of SEPS and the wireless handheld controller are line-of-sight, vertical, and within range.
No Illuminated Indicators	If none of the on-board indicators are illuminated, check the battery fuse.

Issue	Action
SRGL Does Not Turn On	If the Battery Status and System Status indicators are blinking green, the Reverse Polarity indicators are not lit, and the load does not turn on, check:
	Proper wiring of load.
	If SEPS is configured to Autonomous Dusk-to-Dawn Mode, the load will only turn on if it is dark or the solar panel is obstructed.
	If SEPS is configured to On-Demand Wireless Mode, the load will only turn on when commanded by the wireless handheld controller.
	SEPS only does a load scan once at first power up. This load scan will look like a series of short flashes upon first power up while SEPS determines if a load is connected. If the load was connected after SEPS first power up, SEPS would have performed a load scan, detected nothing, and turned the output off. To force a load scan, remove the battery fuse, check that the load is connected properly, and re-install the fuse. SEPS will then perform a load scan as it first powers up.

5.0 Parts/Ordering Codes

To order parts, call ADB Safegate, Americas Customer Service or your local ADB Safegate, Americas representative.

Table 19: Solar Sign Ordering Codes

Ordering Code

S ☐☐☐ - ☐☐☐ 3 ☐☐ 0

Lamp Type
R = LED
S = LED High Wind[1]

Sign Size
1 = Size 1
2 = Size 2
3 = Size 3
4 = Size 4
5 = Size 5

Module
1 = 1 Module
2 = 2 Modules

Style
S = Solar

Face
1 = Single
2 = Double

Total Number of Panels
2 = 2 panel sign
3 = 3 panel sign
4 = 4 panel sign

3

Power
8 = Solar - Power through leg/power through side with ON/OFF switch

Tether
0 = No tether[2]
1 = One tether on one end of sign

Notes
- Customer to provide legend information and power connection side. It is important to match power cord exit location with legend side.

[1] Use high wind signs in locations where actual wind speed exceeds FAA specifications (Mode 3). High wind signs are tested to a minimum wind load of 327 mph as recommended by FAA technical paper DOT/FAA/AR-TN00/32: Evaluation of Wind-Loading on Airport Signs. High wind signs require four anchor bolts per floor flange except Size 1, which uses the standard 2-bolt foot.

[2] Not ETL Certified.

SEPS Ordering Code[1,5] For Solar Sign

SEPS-1 ☐☐☐ - ☐☐ 11

Type
1 = FAA L-858(L) sign

Size
1 = Size 1
2 = Size 2
3 = Size 3
4 = Size 4
5 = Size 5

Modules
1 = 1 module
2 = 2 modules

Autonomous Setting[2]
1 = Dusk to Dawn

Solar Region[3]
1 = Region 1 (blue)
2 = Region 2 (green)
3 = Region 3 (white)
4 = Region 4 (yellow)
5 = Region 5 (red)

Remote Control
1 = Non-Wireless
2 = Wireless - max. time-out4
3 = Wireless - 15 min. time-out4

Notes

[1] The SEPS carries the CE mark. The solar sign does not require a CE mark as it does not contain any active components.

[2] The SEPS is factory configured to work autonomously for dusk-to-dawn operation. On autonomous mode the prod- uct turns on at the intensity that is sustainable in that solar region. See Table 2.

[3] Refer to solar map to determine solar region.

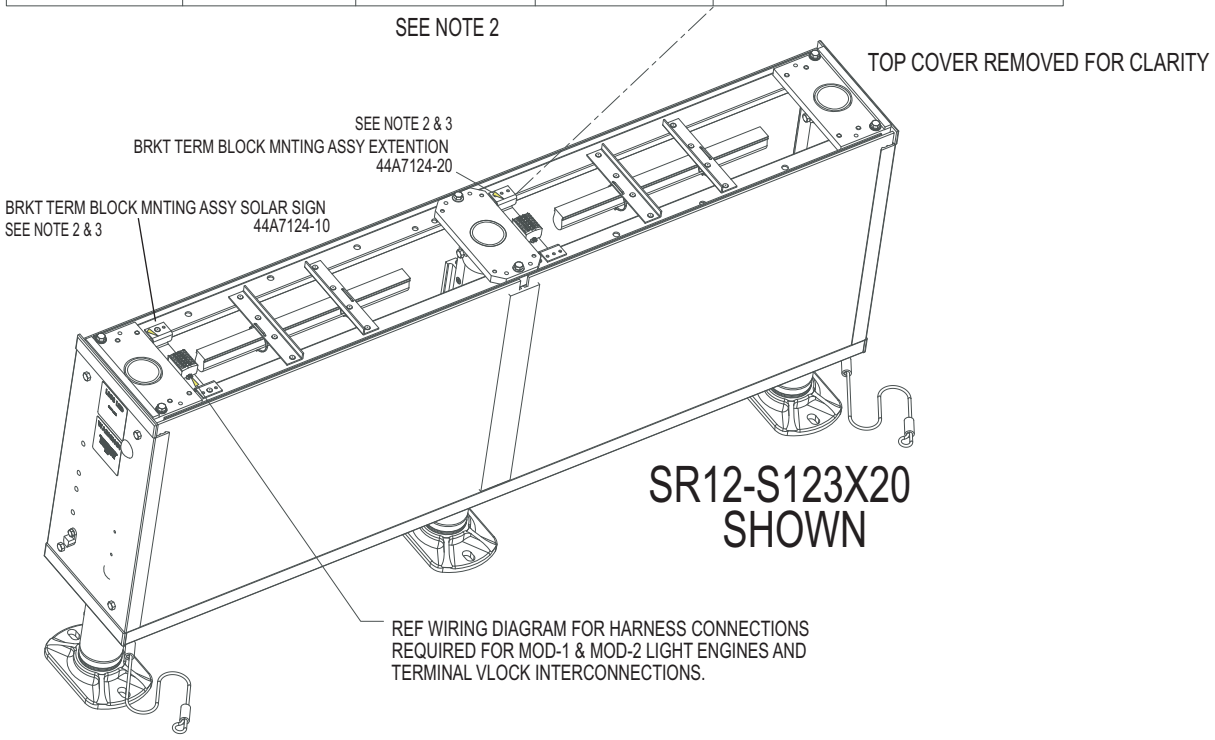
[4] See the Wireless Hand-Held Controller section for details on Maximum Time-Out and 15-minute Time Out options.

[5] Mounting hardware must be purchased separately: Frangible coupling and mounting flange kit (Part No. 94A0581) and optional tether (Part No. 94A0054).

Figure 16: Dual Modual Sign

TERMINAL STRIP WIRING TABLE MOD 2 SIGNS

NOT USED	NOT USED	SOLAR ENGINE + MOD-2 HARNESS	SOLAR ENGINE - MOD-2 HARNESS	NOT USED	NOT USED
1	2	3	4	5	6
NOT USED	NOT USED	SOLAR SIGN + MOD-2 HARNESS	SOLAR SIGN - MOD-2 HARNESS	NOT USED	NOT USED



NOTES:
1. SOLAR SIGNS MAY BE POWERED THRU LEG OR THRU SIDE. BOTH ARE SHOWN IN VIEWS SHOWN. 77A0147 SHIPPED IN KIT AND REPLACES HOLE PLUG IF POWERING SIGN THRU SIDE.
2. REF. MRP BOM FOR HARNESSES REQUIRED.
3. TERMINAL BLOCK ASSEMBLY IS TO MOUNT AT POWER ENTRY END OF SIGN. MOUNTING OF TERMINAL STRIP ASSEMBLY IN SECOND MODULE MAY REQUIRE DRILL TWO HOLES FOR POP RIVET.

Figure 17: Single Module Sign

NOTES:
1. SOLAR SIGNS MAY BE POWERED THRU LEG OR THRU SIDE. BOTH ARE SHOWN IN VIEWS SHOWN. 77A0147 SHIPPED IN KIT AND REPLACES HOLE PLUG IF POWERING SIGN THRU SIDE.
2. REF. MRP BOM FOR HARNESSES REQUIRED.
3. TERMINAL BLOCK ASSEMBLY IS TO MOUNT AT POWER ENTRY END OF SIGN. MOUNTING OF TERMINAL STRIP ASSEMBLY IN SECOND MODULE MAY REQUIRE DRILL TWO HOLES FOR POP RIVET.

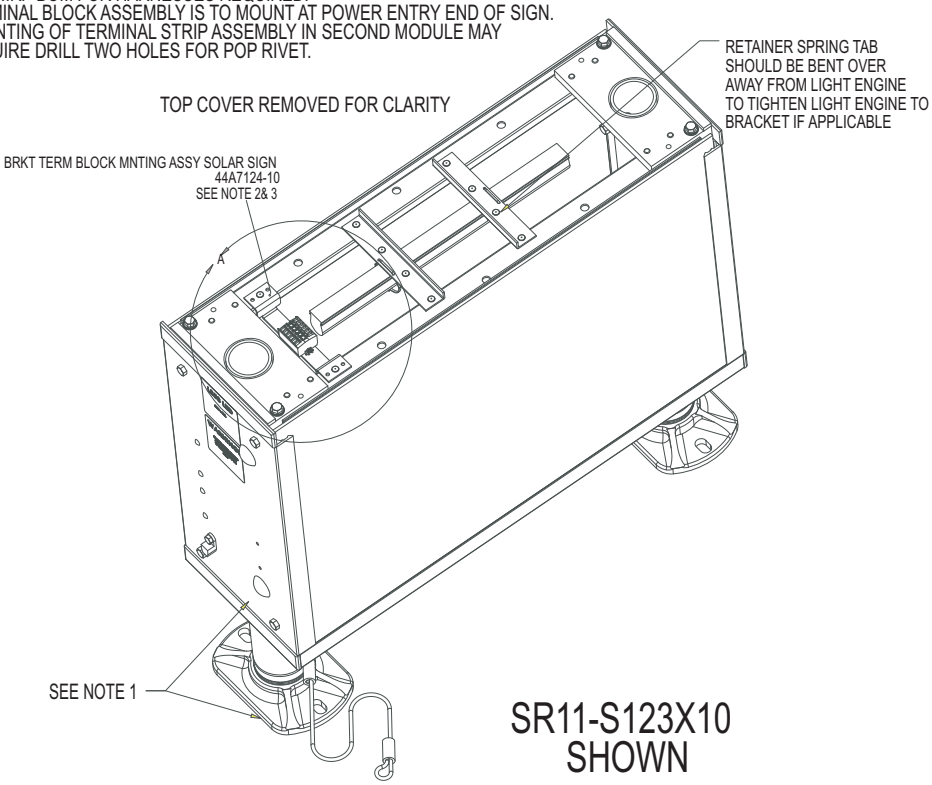
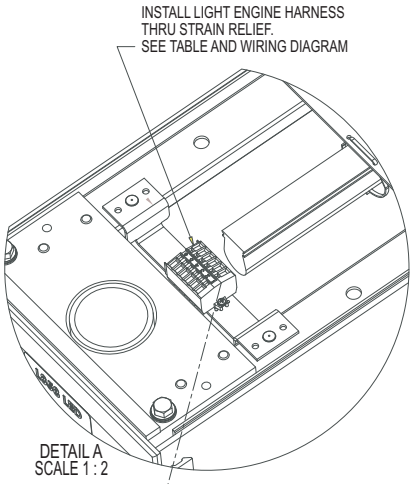


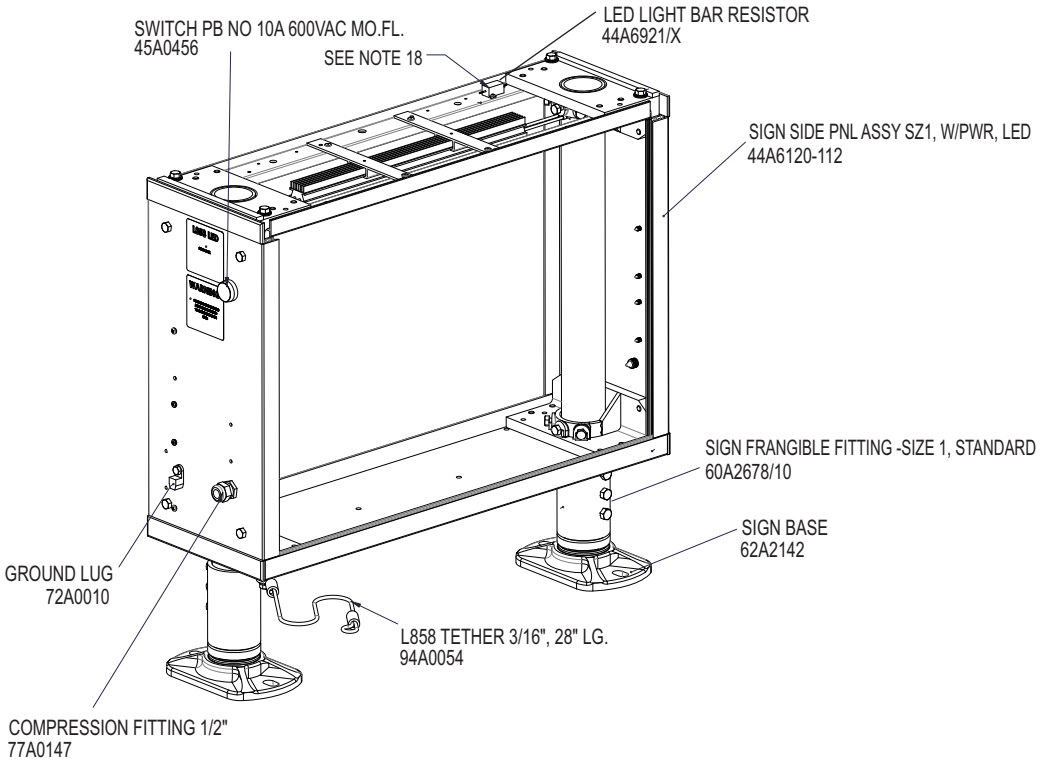
Figure 18: Wiring Diagram



TERMINAL STRIP WIRING TABLE MOD 1 OR MOD 2 SIGNS

SOLAR ENGINE + RED	SOLAR ENGINE - BLACK	SOLAR ENGINE + BLUE	SOLAR ENGINE - GREEN	SOLAR ENGINE + ORANGE	SOLAR ENGINE - WHITE
1	2	3	4	5	6
SOLAR SIGN + MOD-1 HARNESS	SOLAR SIGN - MOD-1 HARNESS	SOLAR SIGN + MOD-2 HARNESS	SOLAR SIGN - MOD-2 HARNESS	NOT USED	NOT USED

Figure 19: Sign Parts Diagrams Size 1, Single Module Sign Parts

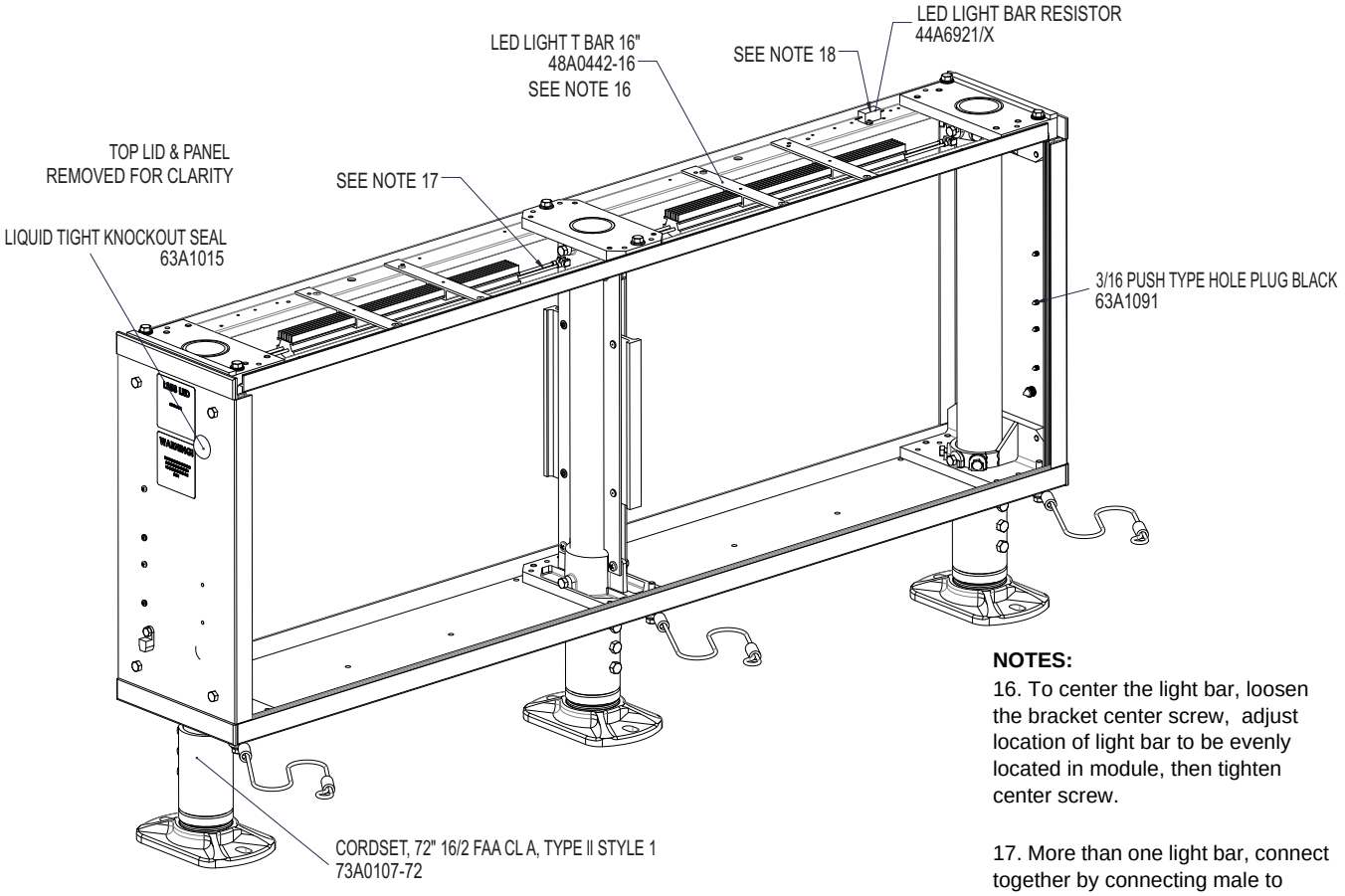


5.1 Spare Components

Table 20: Parts

Description	Part No.
Floor flange (2-bolt)	62A2142
Floor flange, high wind speed (4-bolt)	62A2146
Frangible coupling, size 1	60A2678-10
Frangible coupling, size 2	60A2678-20
Frangible coupling, size 3 or 5	60A2678-30
Frangible coupling, size 4	60A2678-40
Tether	94A0054
LED light engine (bar), Size 1 and 4	48A0442-16
LED light engine (bar), Size 2	48A0442-24

Figure 20:



SR12-7223130

NOTES:

16. To center the light bar, loosen the bracket center screw, adjust location of light bar to be evenly located in module, then tighten center screw.

17. More than one light bar, connect together by connecting male to female to adjoining light bars

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