



SOLARMOUNT-E™

SOLARMOUNT-E: THE BEST JUST GOT BETTER.

Engineering, Excellence, and Ease.

Performance Engineered for versatility and reduced installation time, SOLARMOUNT-E offers unprecedented speed, ease, and flexibility.



INSTRUCTIONS FOR USERS
AND INSTALLATION GUIDE

 **UNIRAC®**

A HILTI GROUP COMPANY

TABLE OF CONTENTS

TABLE OF CONTENTS	2
DISCLAIMER	2
SOLARMOUNT-E COMPONENTS	3
INSTALLATION PLANNING	4
INSTALLATION INSTRUCTIONS	6
GROUNDING CONSIDERATIONS	15
TILT INSTALLATION OPTION	16

DISCLAIMER

Unirac Inc. makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

The information in this document is subject to change without notice.

Unirac shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance, or use of this material.

This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Unirac.

Unirac Inc.
Marketing Department
1411 Broadway Boulevard, NE
Albuquerque, NM 87102-1545
marketing@unirac.com

Copyright © Unirac Inc., 2012. All rights reserved.

SolarMount™ and SOLARMOUNT-E™ are trademarks of Unirac Inc. in the United States of America and other countries.

FOR PRODUCT WARRANTY INFORMATION, PLEASE SEE www.unirac.com.

SOLARMOUNT-E COMPONENTS



Beam

SOLARMOUNT-E Beam = 2.2" Height



End Clamp

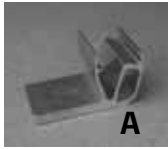
- (1) 5/16" - 18 Stainless steel serrated head hex bolt (minimum tensile strength - 70 ksi) Install to a torque of 10 ft-lbs
- (1) End Clamp



Mid Clamp

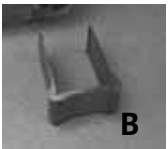
- (1) 5/16" - 18 Stainless steel serrated head hex bolt (minimum tensile strength - 70 ksi) Install to a torque of 10 ft-lbs
- (1) Mid Clamp

Clamp Bolt Length (Inches)	Module Height (Inches)
1.25	0.95 to 1.60
1.75	1.45 to 2.00



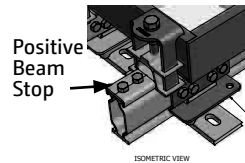
Flange Attachment

- (1) 5/16" x 3-1/2" Zinc Plated Lag Bolt
- (1) Stainless steel washer
- (1) Flange Attachment - See Figure A
- (1) Clip - See Figure B



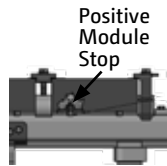
Beam Splice / Lateral Retainer

- (4) Self-drilling screws (1-1/4"-20 hex washer head stainless steel: 70 ksi minimum tensile strength)
- (1) Beam Splice



Positive Beam Stop

- (2) Self-drilling screws (1-1/4"-20 hex washer head stainless steel: 70 ksi minimum tensile strength)
- (1) Positive Beam Stop
- SEE PAGE 11 FOR DETAILS**



Positive Module Stop

- (1) Stainless Steel 1/4"-20 X 1/2" Socket Head Cap Screw
- (1) Serrated Flange Nut
- SEE PAGE 11 FOR DETAILS**

OPTIONAL COMPONENTS



2-Piece Aluminum Standoff

- (1) 3/8" x 3/4" Hex Head Bolt
- (1) 3/8" x 1-3/4" EPDM Washer
- (1) Aluminum Standoff Base
- (1) Aluminum Cylinder - 3", 4", 6" or 7"

See installation note on Pages 6 and 16.



PV Quick Mount

- (1) 5/16" x 3-1/2" Stainless Steel Lag Bolt
- (1) 5/16" Sealing Washer
- (1) 5/16" EPDM Washer
- (1) 9 1/2" x 12 1/2" Flashing



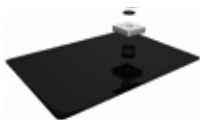
CreoTecc Tile Hook (Top)

- (1) 3/8-16 x 3/4" Hex Head Bolt
- (1) 3/8" Hex Head Nut
- (1) Aluminum Tile Hook



Leveling Components

- (1) Adjustable set of Aluminum Leveling Components



Unirac Flat Flashing

- (1) 12" x 8" flashing with attached gasket
- (1) Aluminum square compression plate
- (1) 5/16" EPDM Washer



ACECLAMP JR - Standing Seam Metal Roof Mounting Solution

PLANNING YOUR SOLARMOUNT-E INSTALL

Pre-Install Considerations

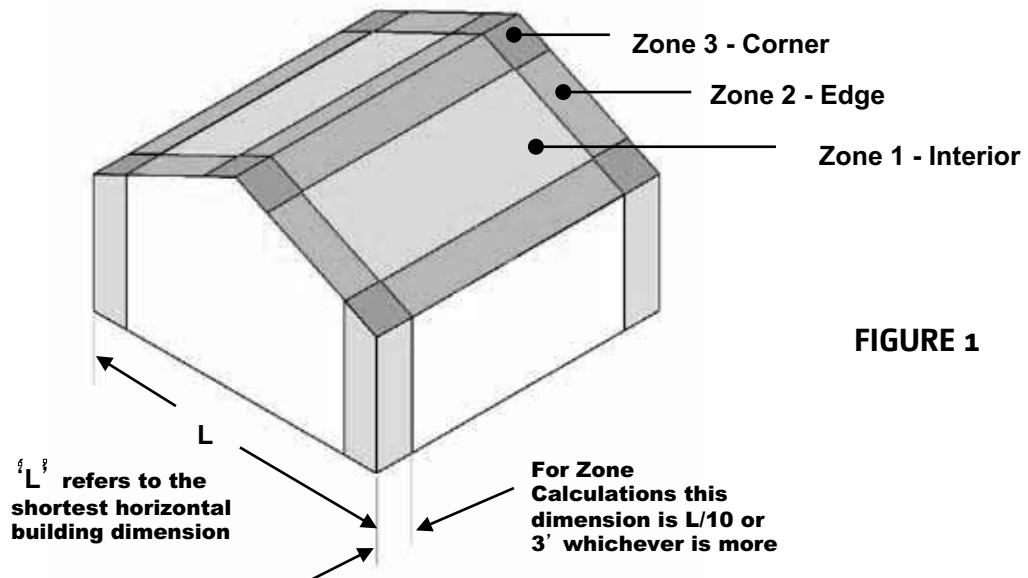
Unirac recommends the contractor or installer review all sections of this manual as early as possible in the design and planning process. Addressing these items early on will help in the design process and ensure a trouble free application.

1. Complete a structural analysis of the roof to confirm it will support the design loads of the planned installation. Also review the roof attachment inspection guidelines for your area.
2. Check the module manufacturer's installation guidelines to confirm warranty compliant module clamping before planning the array layout.
3. Prepare a draft plan of the roof and the planned layout to confirm the required roof area is available and to address any roof obstacles or shading issues.

Roof Zones and Design Considerations

Zone 1 is generally a preferred install location due to greater span allowances and fewer attachments. Zones 2 & 3 are allowable, but shorter spans (more attachments) are generally required to address the design loads in those areas.

Plan the layout so the array does not overhang the edge of the roof or extend past the roof peak in any location! These deviations will generally not meet code requirements.



PLANNING YOUR SOLARMOUNT-E INSTALL

⚠ NOTE: DO NOT attach rail directly to roof without flashing, standoff, ACECLAMP JR., or tile hook. See *Roof Attachment Options* on Page 6.

The installation can be laid out with beams parallel to the rafters or perpendicular to the rafters. Note that SOLARMOUNT-E Beams make excellent straight edges for doing layouts.

Center the installation area over the structural members as much as possible.

Leave enough room to safely move around the array during installation. Local building codes may require minimum clearances around such installations.

When calculating beam length, add one inch (1") between modules for the mid-clamps. Add three inches (3") for beams running parallel to the ridge line, or four inches (4") for beams running perpendicular to the ridge line.

To speed installation, mark beam at approximate locations of the flange attachments before clicking attachments to the beam.

⚠ NOTE: Modules installed parallel to the roof surface according to ICC-ES-ESR-3083 are recognized by the International Code Council as compliant to the IBC and IRC (See Figure 2, below). Modules tilted to relative to the roof surface are not recognized by ICC-ES-ESR-3083 (See Figure 3, below).

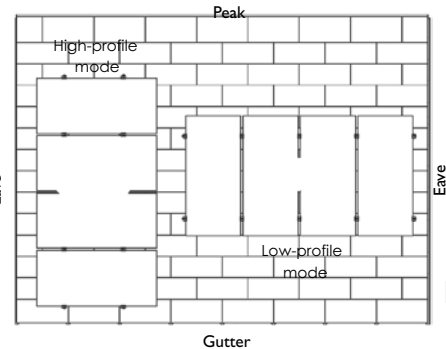
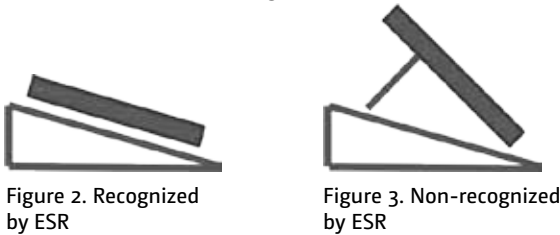


FIGURE 4

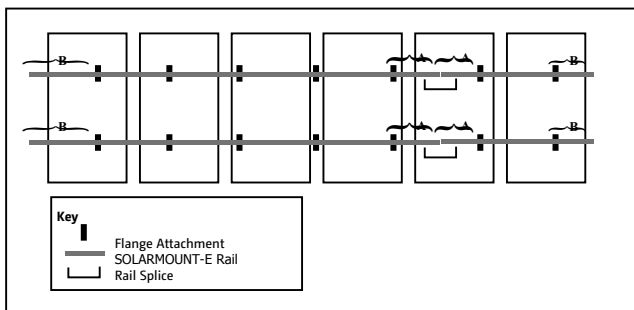


FIGURE 5

Dimension A: Beam cantilever limits apply at spliced overhangs.

Note: There must be a minimum of TWO attachments on either side of a splice.

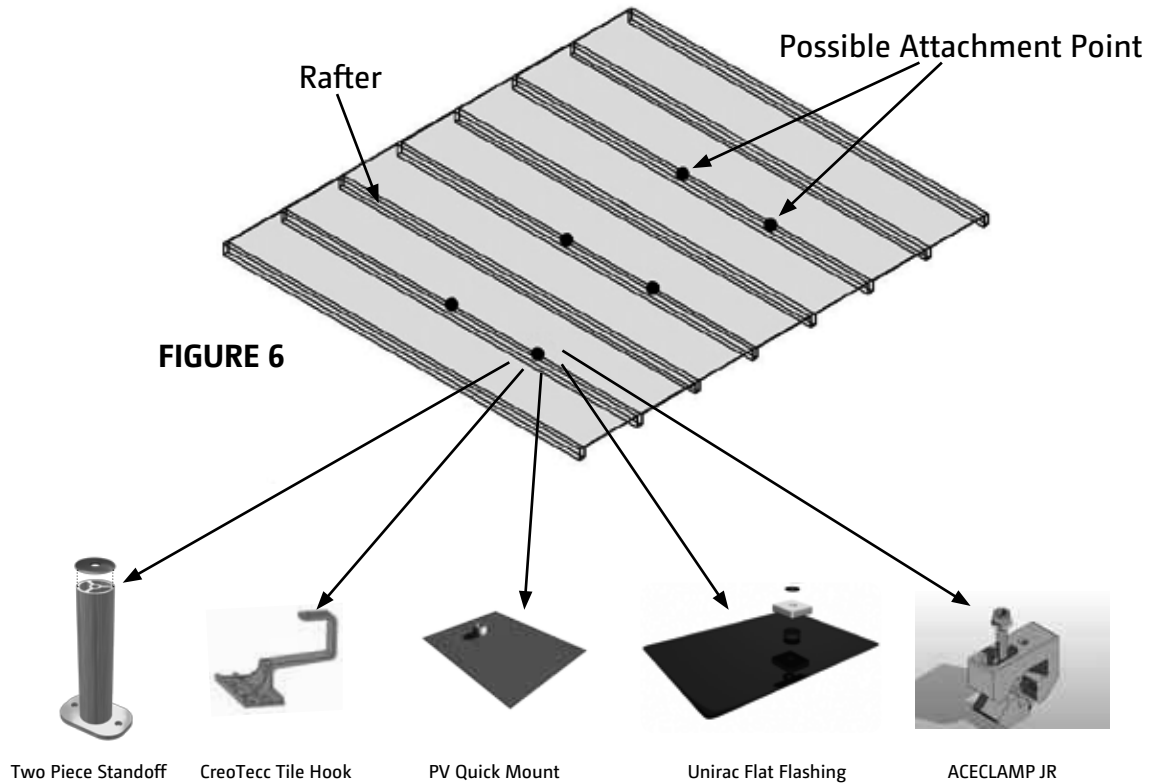
Dimension B: Maximum cantilever cannot exceed 40% the maximum span for your installation

INSTALLATION INSTRUCTIONS

1. Install Applicable Roof Attachment Option

Roof Attachment Options

There are many attachment methods available. Unirac recommends always attaching to a structural roof member such as a rafter. **Best practice requires that you use one of the attachment options below.**



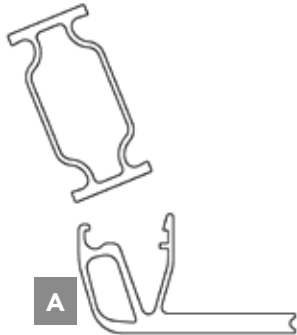
⚠ NOTE: If attaching tilt legs to standoffs, Unirac recommends that the stock hole in the SOLARMOUNT-E Tilt Leg Foot be bored out for a 3/8" fastener to make it compatible with them. For applications where a 5/16" fastener will be used, the stock diameter hole requires no modification.

2. Snap Beam to Flange Attachment

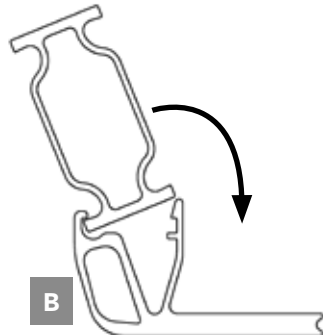


⚠ NOTE: Always engage the double-wall side of the flange attachment before snapping attachment onto beam. See below.

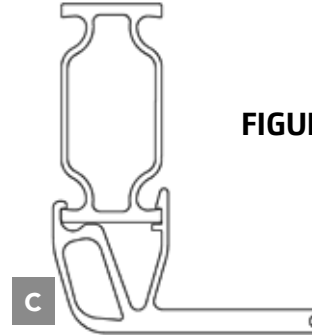
NOTE: Do not use attachment if the engagement features on the attachment are bent, damaged, or obstructed by debris.



Insert flange of beam into double-wall side of attachment



Rotate beam into attachment

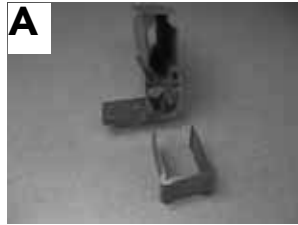


Beam is secured when an audible "click" occurs

FIGURE 7

⚠ NOTE: DO NOT re-use flange attachments.

3. Snap the Clip to the Flange Attachment



A
The clip is used to secure the attachment



B
Insert the clip onto either side of the attachment



C
Ensure clip is fully inserted into the attachment



4. Install Beam Retainer/Splices using self-drilling screws



A
Retainer/splice may be installed on the top or bottom flange of the beam. At least 1 retainer must be placed over an attachment for each run of beams



B
A drill driver may be used to install the four (4) self-drilling screws. Over-tightening the screws will result in stripped threads.

5. Secure Flange Attachments to applicable roof attachments

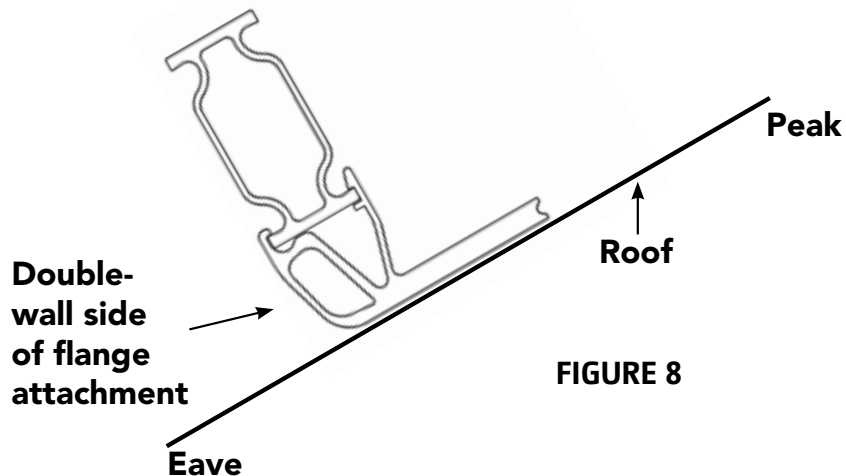
⚠ NOTE: DO NOT attach rail directly to roof without flashing, standoff, ACECLAMP JR., or tile hook. See *Roof Attachment Options* on Page 6.

⚠ NOTE: DO NOT fully tighten bolts until leveling is completed. See Page 10.



⚠ NOTE: When installing on pitched roof configurations, locate double-wall section of the flange attachment on the downhill side of roof slope.

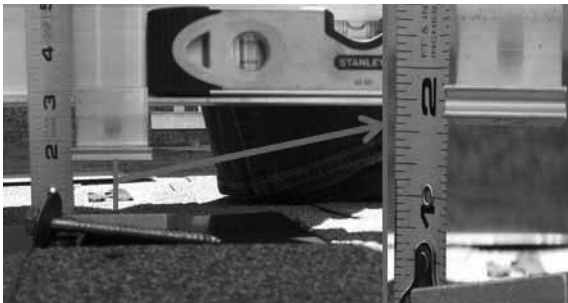
⚠ NOTE: DO NOT re-use flange attachments.



6. If leveling is needed, insert Leveling Components, then tighten all flange attachments to applicable roof attachments



You can use a piece of SOLARMOUNT-E rail to determine if leveling is needed.



There is about a one inch gap here. Leveling is needed.



Snap in Leveling Components as necessary. You can break them apart if needed.

⚠ NOTE: DO NOT exceed a thickness greater than 1½ inches of Leveling Components.

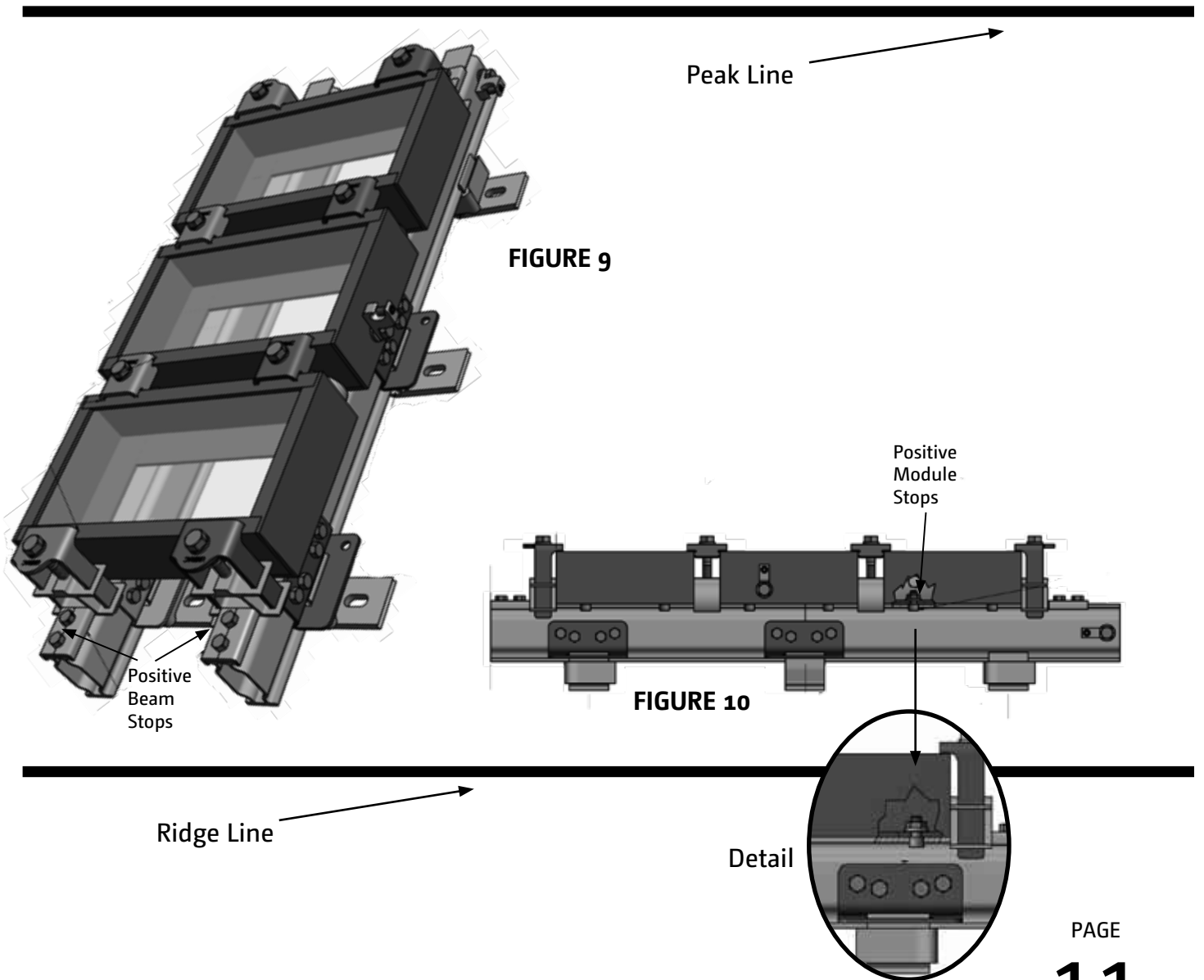


Leveling complete. Tighten connection to roof attachment.

7. Attach Positive Beam Stops and Positive Module Stops as necessary.

⚠ NOTE: A **Positive Beam Stop** (See Page 3) must be installed on the lowest end of each run of beams installed **PERPENDICULAR** to the ridge line to resist gravity loads. Use two (2) Unirac supplied 1/4"-20 X 1" hex washer head #3 point stainless steel self drilling screws. See Figure 9 below.

Two (2) **Positive Module Stops** (See Page 3) must be installed on each module when beams are installed **PARALLEL** to the ridge line to resist gravity loads. Use Unirac supplied stainless steel 1/4"-20 X 1/2" socket head cap screws and serrated flange nuts. Positive Module Stops may be installed at the 1/4 point mounting holes of the module and must be in contact with one beam. See Figure 10 below.



8. Install additional Beam Splices directly over Flange Attachments to act as lateral retaining clips



⚠️ NOTES ON THERMAL EXPANSION:

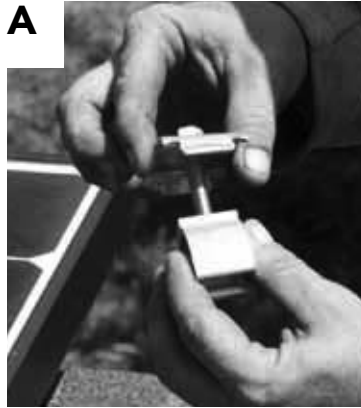
SOLARMOUNT-E is designed to minimize the effects of thermal expansion by allowing the beams to expand and contract independently between connections and attachments. To minimize the effect of thermal expansion, restrict continuous beam lengths to 40 feet. Modules MAY NOT be placed over a thermal expansion joint/break.

⚠️ NOTE ON SPLICES:

Please refer to technical datasheets for recommended distances between splices.

9. Install modules using Mid and End Clamps

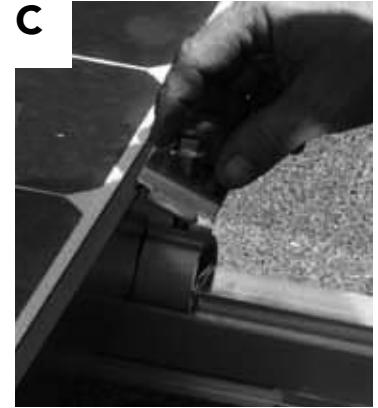
Mid Clamp



Ensure mid clamp is oriented properly with the "teeth" overhanging the module

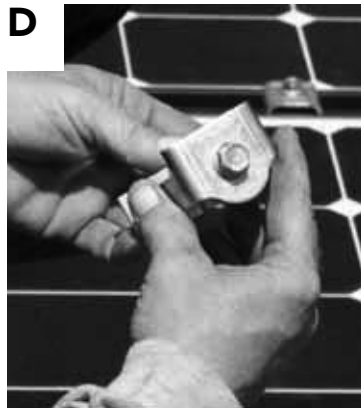


Install clamps as shown in Figure 11, A through C on Page 14.



Slide both modules into place before tightening mid clamp

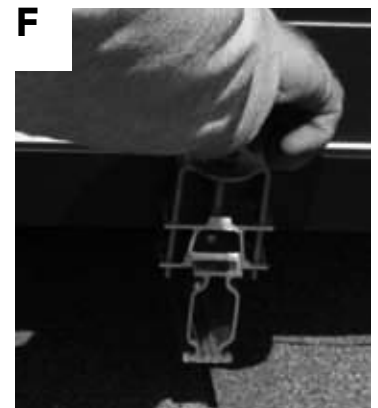
End Clamp



Ensure end clamp is oriented properly with the "teeth" overhanging the module



Slide end clamp over the end of beam



Tighten end clamp

⚠ ELECTRICAL CONSIDERATIONS:

SOLARMOUNT-E is intended to be used with PV modules having a system voltage less than or equal to 600 VDC. A minimum 10 AWG copper grounding conductor should be used to ground the system, according to the National Electric Code and the authority having jurisdiction. It is the installer's responsibility to check local codes, which may vary.

Bonding components compatible with SOLARMOUNT-E:

- Wiley WEEPlug (P/N 980011) Torque for 1/4" mounting hardware is 10 ft-lbs.
- IlSCO lay-in lug (P/N GBL-4DB) Torque for 10-32 mounting hardware is 5 ft-lbs.

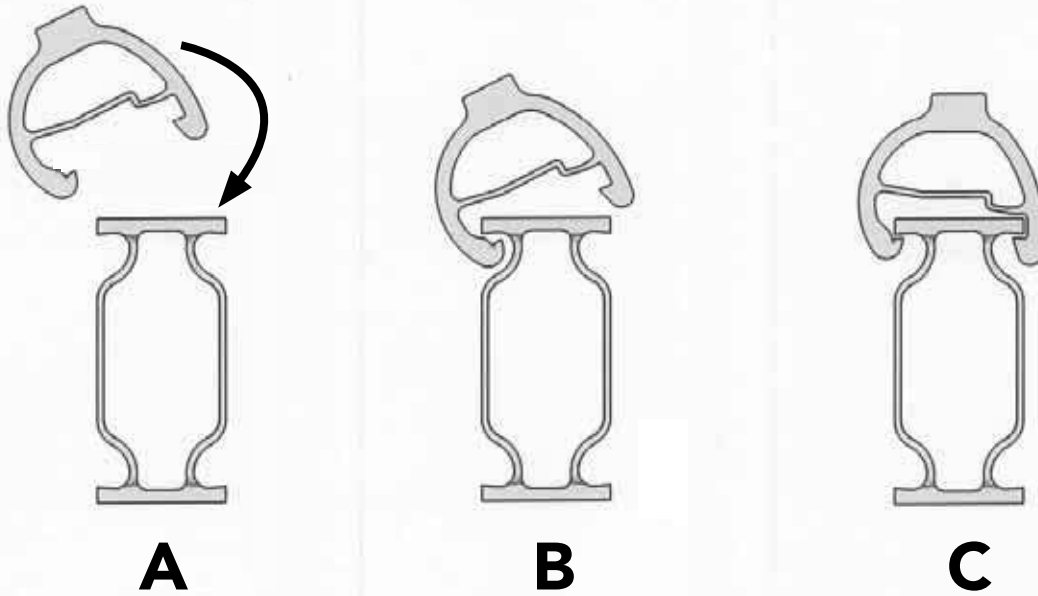
SOLARMOUNT-E Beams are anodized to AA-M12 or AA-M12C22A24.

Modules should be secured with a minimum of four clamps. Mid clamps may be shared between two modules. The maximum length of installed PV module is 85".

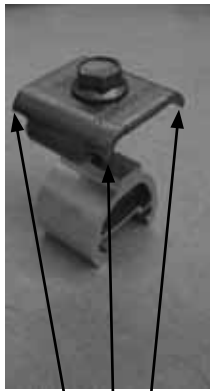
The maximum module width and maximum distance between roof attachments are supplied in the engineering charts for SOLARMOUNT-E.

Clamp Installation Detail

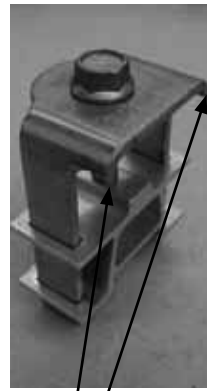
FIGURE 11



⚠ NOTE ON MID AND END CLAMPS: Teeth on Mid and End Clamps provide module to module bonding as required by Underwriters Laboratory. A complete grounding solution must comply with local code and inspection requirements. See also ELECTRICAL CONSIDERATIONS on p. 13 and GROUNDING CONSIDERATIONS on p. 15.



Bonding Tooth



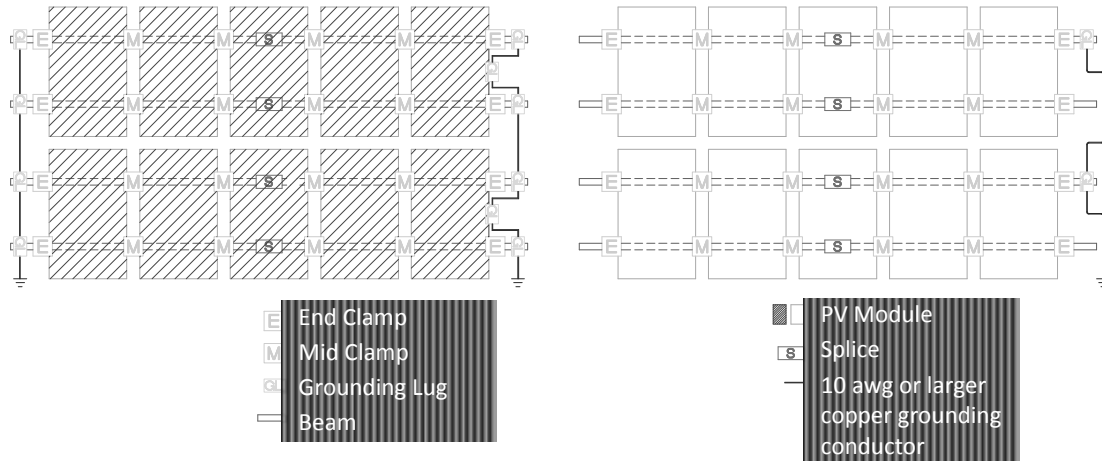
Bonding Tooth

GROUNDING CONSIDERATIONS

Bonding and Grounding Diagram

Left: Dark finish racking
Right: Mill finish racking

FIGURE 12



NOTE 1: Mill finish mid-clamps bond module to module, and module to beam.

NOTE 2: Dark finish mid-clamps bond module to module, but not module to beam.

NOTE 3: Splices do not provide a certified bonding path.

NOTE 4: Modules spanning a splice provide a bonding path across the splice.

Installation of Lugs

FIGURE 13

**WEEB
Lug on PV
Module**

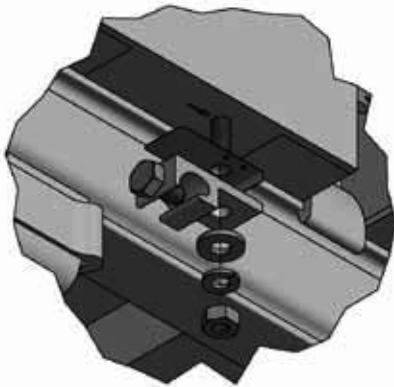


FIGURE 14

**IlSCO Lug
on PV
Module**

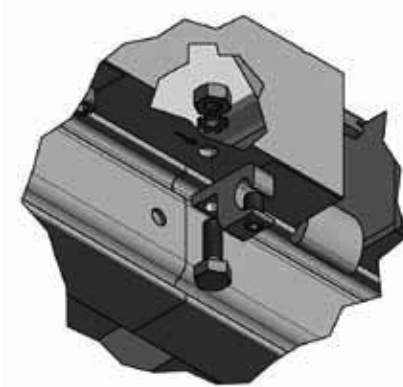


FIGURE 15

**WEEB
Lug on
Beam**

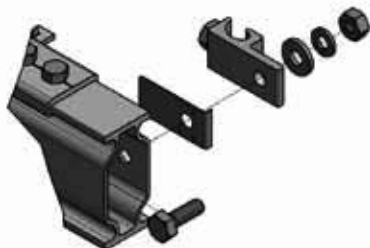
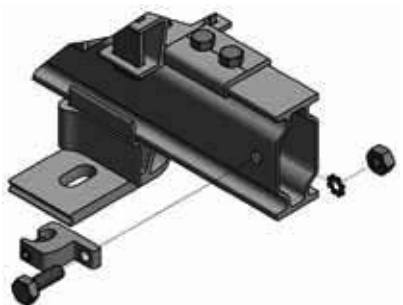


FIGURE 16

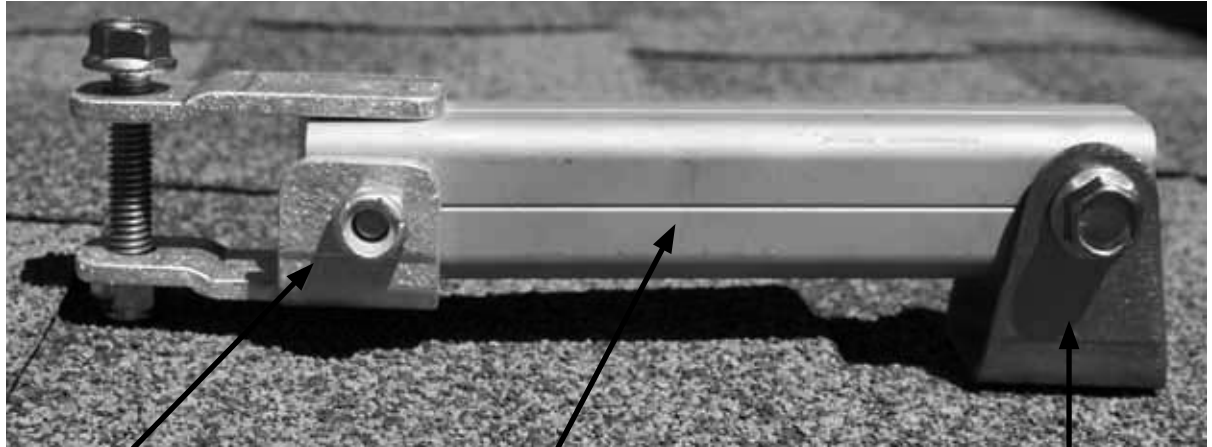
**IlSCO Lug
on Beam**



TILT INSTALLATION OPTION

⚠ NOTE: Torque all tilt hardware to 5 ft-lbs.

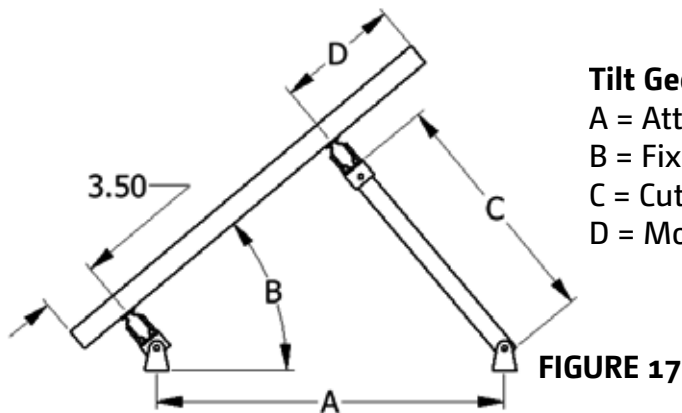
Tilt Leg Components



Cap

Tilt Leg

Foot



Tilt Geometry

A = Attachment Separation

B = Fixed Tilt Angle

C = Cut Tilt Leg to Length

D = Module Overhang

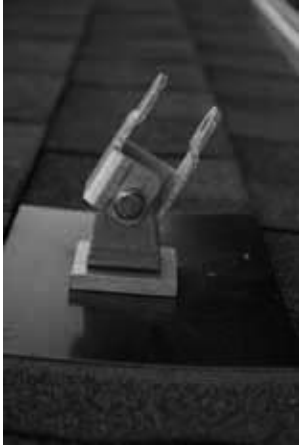
1. Attach Foot to all roof attachment points.

⚠ NOTE: DO NOT attach tilt leg directly to roof without appropriate flashing or standoff. See *Roof Attachment Options* on Page 6.

⚠ NOTE: If attaching to standoffs, Unirac recommends that the stock hole in the SOLARMOUNT-E Tilt Leg Foot be bored out for a 3/8" fastener to make it compatible with them. For applications where a 5/16" fastener will be used, the stock diameter hole requires no modification.



2. Attach Cap to all South Feet. Attach Tilt Leg and Cap to all North Feet.



South Foot



North Foot

⚠ NOTE: Ensure cap is oriented as shown.

⚠ NOTE: Cut tilt leg to appropriate length, and if necessary, drill holes $\frac{1}{2}$ " from end.

3. Insert SOLARMOUNT-E Beam into Caps



4. Mark and drill hole through Beam to fasten Caps to Beams

May remove Beam from Cap to make drilling easier, if necessary

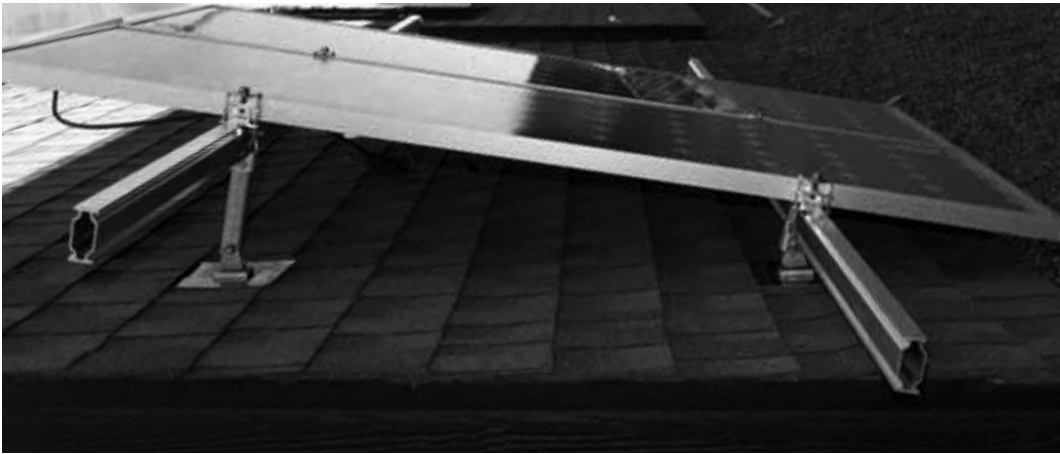


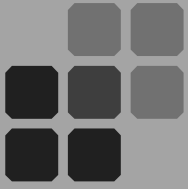
5. Fasten Beams to Caps using supplied hardware



6. Install modules using Mid and End Clamps

See Pages 13-15 for details





 SOLARMOUNT-ETM



Publication Number
120321-1ii
March 2013

 **UNIRAC**[®]
A HILTI GROUP COMPANY