

CITY OF SACRAMENTO
1231 I Street, Sacramento, CA 95814

Permit No: 0005817
Insp Area: 2

Site Address: 6819 SOUTH LAND PARK DR SAC
Parcel No: 029-0054-007

Sub-Type: RES
Housing (Y/N):

CONTRACTOR
CENTURY HOMESTEAD INC
4580 POWER INN RD
SACRAMENTO CA 95826

OWNER
YOUNG SHIRLEY/GORDON K
6819 SOUTH LAND PARK D
SACRAMENTO CA 95831

ARCHITECT

Nature of Work: 35 SQ T/O RESHEET REROOF W 40 YR DIM LAM COMP

CONSTRUCTION LENDING AGENCY: I hereby affirm under penalty of perjury that there is a construction lending agency for the performance of the work for which this permit is issued (Sec. 3097, Civ. C).

Lender's Name _____ Lender's Address _____

LICENSED CONTRACTORS DECLARATION: I hereby affirm under penalty of perjury that I am licensed under provisions of Chapter 9 (commencing with section 7000) of Division 3 of the Business and Professions Code and my license is in full force and effect.

X License Class B License Number 700835 Date 5-30-00 Contractor Signature [Signature]

OWNER-BUILDER DECLARATION: I hereby affirm under penalty of perjury that I am exempt from the contractors License Law for the following reason (Sec. 7031.5, Business and Professions Code; any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he or she is licensed pursuant to the provisions of the Contractors License Law (Chapter 9 (commencing with Section 7000) of Division 8 of the Business and Professions Code) or that he or she is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars (\$500.00);

____ I, as a owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professional Code: The Contractors License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or herself or through his/her own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he/she did not build or improve for the purpose of sale.)

____ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractors License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractors License Law).

____ I am exempt under Sec. _____ B & PC for this reason: _____

Date _____ Owner Signature _____

IN ISSUING THIS BUILDING PERMIT, the applicant represents, and the city relies on the representation of the applicant, that the applicant verified all measurements and locations shown on the application or accompanying drawings and that the improvement to be constructed does not violate any law or private agreement relating to permissible or prohibited locations for such improvements. This building permit does not authorize any illegal location of any improvement or the violation of any private agreement relating to location of improvements.

I certify that I have read this application and state that all information is correct. I agree to comply with all city and county ordinances and state laws relating to building construction and hereby authorize representative(s) of this city to enter upon the abovementioned property for inspection purposes.

X Date 5-30-00 Applicant/Agent Signature [Signature]

WORKER'S COMPENSATION DECLARATION: I hereby affirm under penalty of perjury one of the following declarations:
____ I have and will maintain a certificate of consent to self-insure for workers' compensation as provided for by Section 3700 of the Labor Code, for the performance of work for which the permit is issued.

[Signature] I have and will maintain workers' compensation insurance, as required by Section 3700 of the Labor Code, for the performance of the work for which this permit is issued. My workers' compensation insurance carrier and policy number are:

Carrier STATE COMP INS FUND (CA) Policy Number 238170 Exp Date 03/15/2001

____ (This section need not be completed if the permit is for \$100 or less) I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the workers' compensation laws of California and agree that if I should become subject to the workers' compensation provisions of Section 3700 of the Labor Code, I shall forthwith comply with those provisions.

X Date 5-30-00 Applicant Signature [Signature]

WARNING: FAILURE TO SECURE WORKER'S COMPENSATION COVERAGE IS UNLAWFUL AND SHALL SUBJECT AN EMPLOYER TO CRIMINAL PENALTIES AND CIVIL FINES UP TO ONE HUNDRED THOUSAND DOLLARS (\$100,000) IN ADDITION TO THE COST OF COMPENSATION, DAMAGES AS PROVIDED FOR IN SECTION 3706 OF THE LABOR CODE, INTEREST AND ATTORNEY'S FEE.

THIS PERMIT SHALL EXPIRE BY LIMITATION IF WORK IS NOT COMMENCED WITHIN 180 DAYS.

0005817K

BASIC ORDER INFO

SHERLEY YOUNG
 6819 SOUTH LAND PARK DR
 SACRO, CA 95831
 (Cross Floren Rd)

PHONE: 445-3047
 WORK PHONE: _____
 CITY: _____

CONTRACT NO: X01022
 DATE: 4-22-00
 PAGE: 337 LAT: 87 LON: _____

THOMAS BROTHERS MAP

(CHECK ALL ITEMS BELOW WHICH PERTAIN)

- EXISTING ROOF:** HOW MANY
- Shale Shingle
 - Composition
 - Built-Up
 - Other
- HEIGHT:**
- Single Story
 - 1 1/2 Story
 - 2 Story
 - Other (Exp. on Rev)
- VENTS AND JACKS:**
- Good Condition (Do Not Replace)
- MILES TO JOB SITE:** 10 Miles
- PITCH AND SLOPE:**
- 4/12
 - 6/12
 - 8/12
 - Flat
 - Other (Exp on Rev)
- TYPE OF SHEETING:**
- Solid Plywood
 - Solid T & G (Exposed Beam)
 - Spaced
- JOB EXTENT:**
- Entire House
 - Partial House (Tie-in Type)
- ROOF DESIGN:**
- Gable
 - Flat
 - Hip and Ridge
 - Dormer
 - Silt Level
- ACCESSIBILITY:**
- Lift Truck Load
 - Walk In Load
 - Conveyor Load
- SPECIAL JOB CONDITIONS: (EXPLAIN ALL ITEMS CHECKED ON REVERSE)**
- A. Shrubs
 - B. Poor House Access
 - C. Blocked Driveway
 - D. Dog in Yard
 - E. Locked Gate(s)
 - F. Pool
 - G. Antenna
 - H. Roof Air Conditioner
 - I. Other (Exp on Rev)
- TYPE OF ROOF:**
- Overlay
 - Tearoff 1 and Overlay
 - Tearoff All
- T/O Date: 5.24.00
 T/O Time: 7am
 T/O Co: _____
- GARAGE:**
- Attached
 - Detached Included
 - Detached NOT INCLUDED in this job

NEED 40 GENSTAR STORM SHIELD

ISSUED

JUN 12 2000

DRYROT INFO:

2X4X _____
 2X6X _____
 2X8X _____
 1X4 V RUSTIC X _____
 1X6 V RUSTIC X _____
 4X8X _____ PLYWOOD _____

TEAR OFF INFO:

- HOW MANY ROOFS TO BE TORN OFF? 1
- TYPES OF ROOFING TO BE TORN OFF? SHAKE
- HOW MANY SQS PER ROOF? 32
- CAN YOU ACCESS ALL OF THE ROOFS WITH A TRUCK? YES
- HAS THE CUSTOMER BEEN INFORMED THAT THERE WILL BE TEAR-OFF DEBRIS IN ATTIC AND GARAGE? YES NO
- ARE WE TO DISPOSE OF IT? IS THERE(X):
- ANTENNA? YES NO
 - A.C. COOLER? YES NO
 - GUTTERS? YES NO
 - SKYLIGHTS? YES NO
 - SOLAR? YES NO
 - EAVES: MASONITE? YES NO
 - CATHEDRAL CEILING? YES NO
- CHIMNEY:**
- REUSE EXISTING FLASHING? YES NO
 - NEW FLASHING? YES NO
 - COUNTER FLASHING? YES NO

GUTTER INFO:

Ft. of gutter to be installed: 245

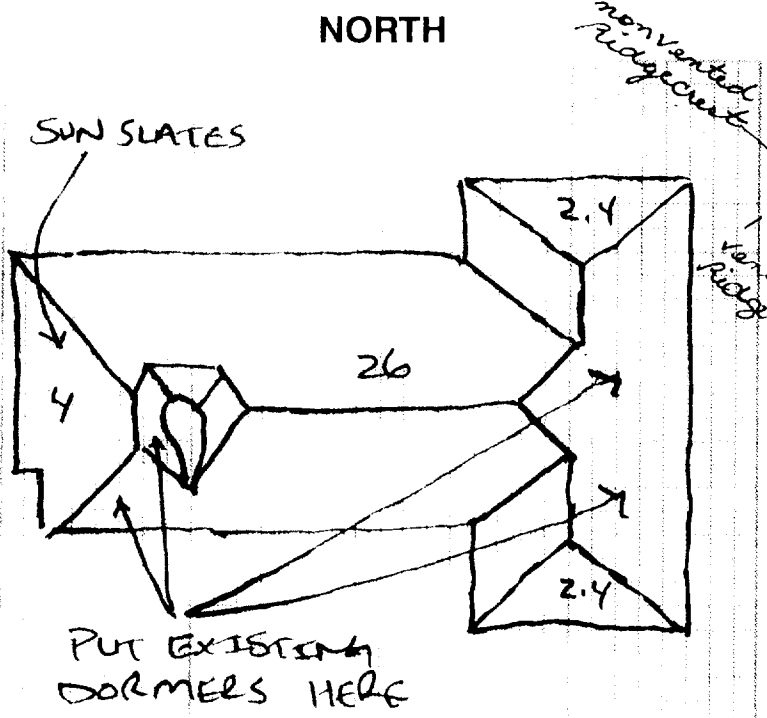
Number of Downspouts installed: 6

Ft. old gutter to be removed: 245

Gutter color: WHITE

Downspout color: WHITE

Ft. gutter guard: _____

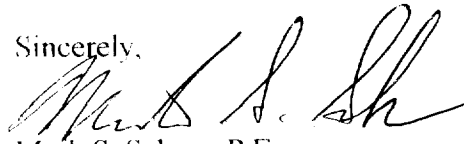


ROOFING INFO:

- TYPE OF ROOF? ELK
- NO. OF YEARS? 40
- COLOR? ANTIQUE SLATE
- SQUARES? 31
- LF RIDGE? 200
- SHADOW OR REGULAR, LF RIDGEVENT? 40 ELK
- LF STARTER? 4BDL
- TURBINES - COLOR -
- DORMERS? EXISTING
- SKYLIGHTS? -
- SKYPIPES? -
- FELT: #15, #30 SQS 36
- LAYFAST SQS -
- LF NOSING: -
- 1 X 2 -
- 1 1/2 X 1 1/2 -
- 2 X 2 -
- LF VALLEY? SD
- VALLEY COLOR? SILVER
- PLYWOOD SQUARES: 114
- 3/8 1/2 -
- 1 X 4 FILL -
- TORCH DOWN SQUARES? FROM SHOP
- TORCH DOWN COLOR? GREY
- BASE? FROM SHOP
- LF METAL -
- 3X3 -
- VENTS AND JACKS:**
- 1 1/2" 3'
 - 2" 4'
 - 4" 1
 - 6" 1
 - 8" -
 - 8" -
- Diagram of vent types: OVAL, Round, Square.

I would like to thank you for allowing me to provide my services in this matter. Please let me know if I may be of further assistance

Sincerely,



Mark S. Schoen P.E.

MSS.mss
P.E. #14AES001

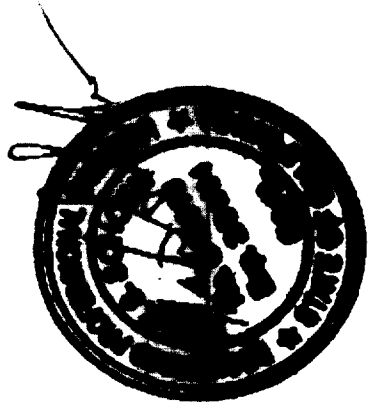


This certificate is given only in regard to the work on the job at [redacted] and is not to be used to make any other kind of certificate for the same without further permission from the Building Inspector, New York.

The approval of this plan and specification SHALL NOT be held to constitute a proof of violation of any City Ordinance or State Law.

16:29/2000 16:11 1916362444F

NOTE 2 OVERHANG IS SHOWN



ADDITION
RIDGE
(ADDITION)

THIS PORTION OF ROOF BUILDING
FRAMED OVER ORIGINAL GARAGE ROOF
ORIGINAL HIP
& RIDGE LINES

5 1/2" x 16"
SUPPORT
BEAM

CORRAL PLATES
INSTALLED ON
THIS SLOPE

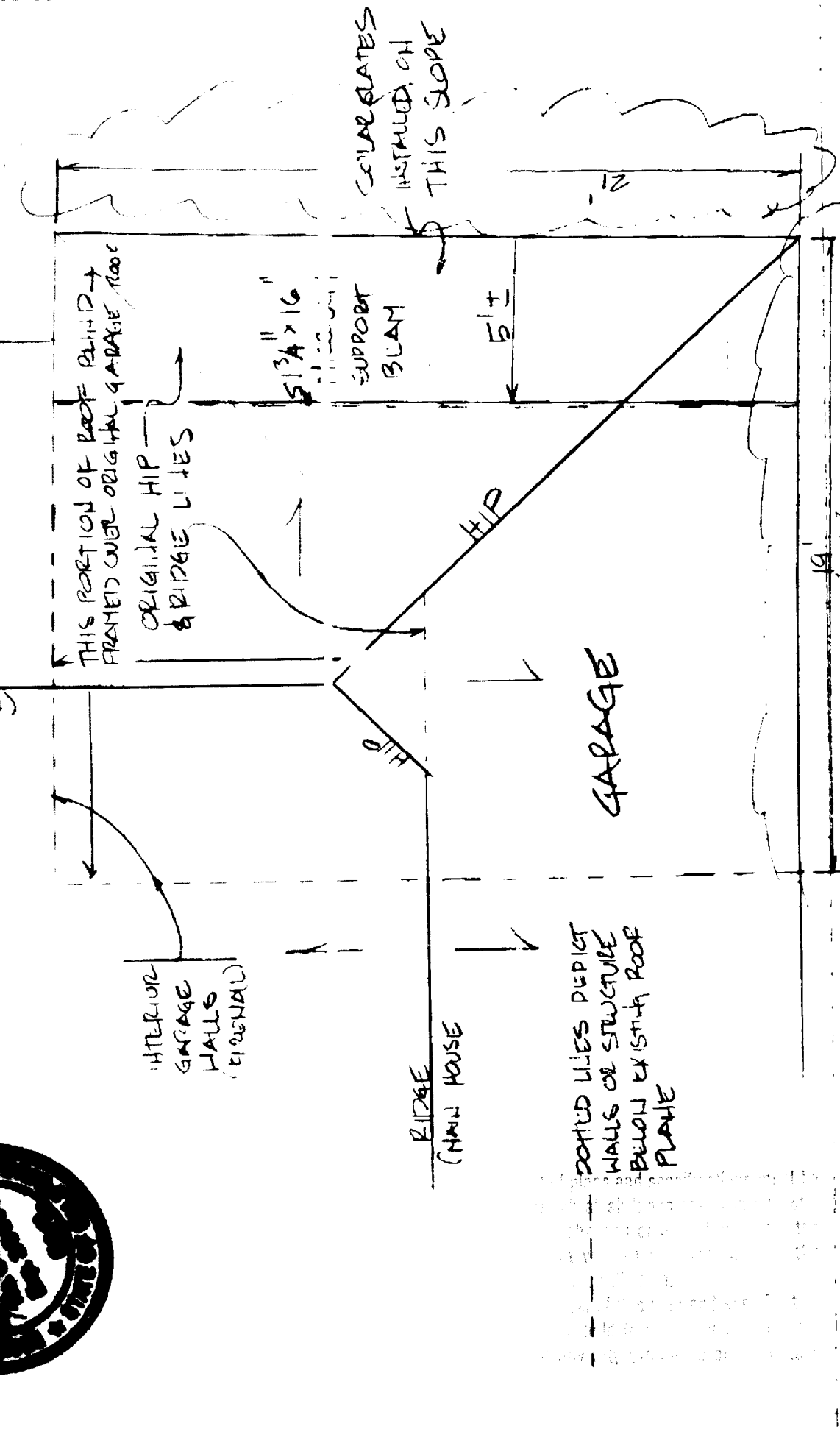
GARAGE

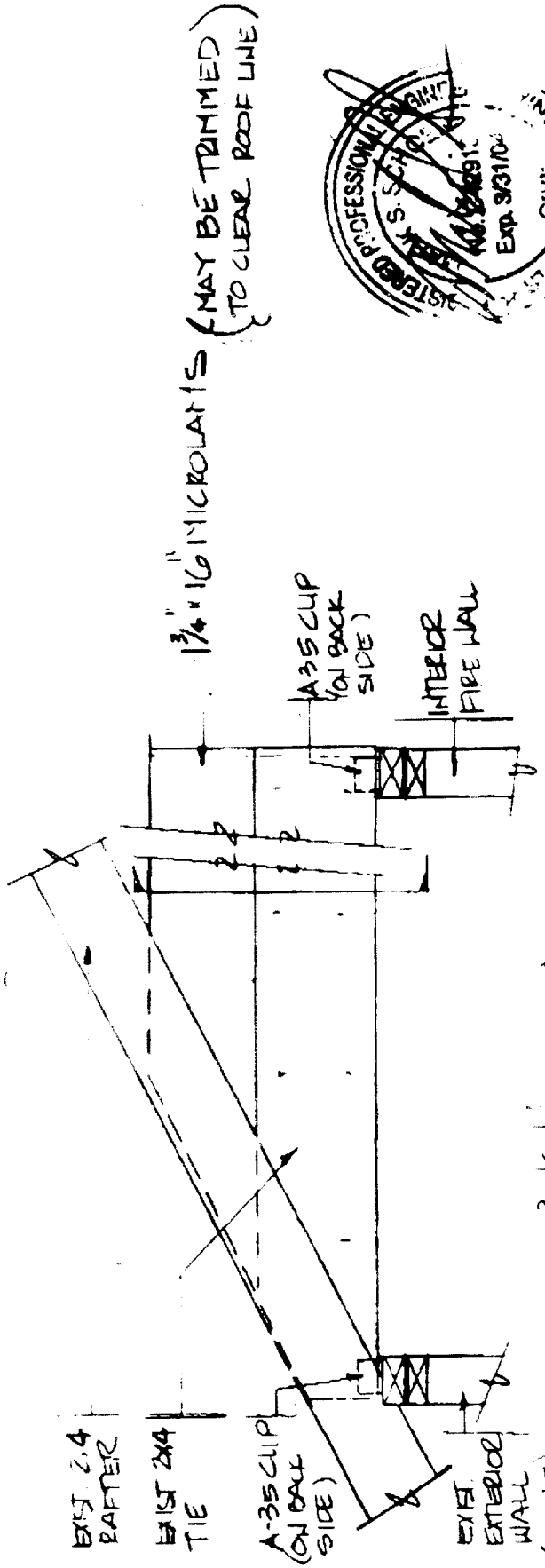
INTERIOR
GARAGE
HALLS
(ORIGINAL)

RIDGE
(MAIN HOUSE)

DOTTED LINES DEPICT
WALLS OR STRUCTURE
BELOW EXISTING ROOF
PLANE

ROOF PLAN OF GARAGE
6819 SOUTH LAND PARK DRIVE
SACRAMENTO CA 95831





1 1/2" x 16" MICROSLATS (MAY BE TRIMMED TO CLEAR ROOF LINE)

A-35 CLIP (ON BACK SIDE)
INTERIOR FIRE WALL

EXIST 2x4 RAFTER

EXIST 2x4 TIE

A-35 CLIP (ON BACK SIDE)

EXIST EXTERIOR WALL (FRONT)

2x4 CLEAT W/ 3x10 SEE PLYWOOD CLIP W/ 8d

2x4 STIFFENER @ 2' O.C. W/ SIMP SDS W/ 3x3 TOP, MIDDLE & BOTTOM

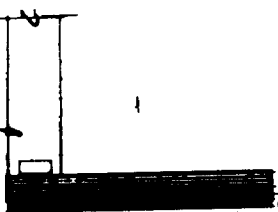
GARAGE ROOF SUPPORT BEAM

2x4 BRACE FOR PURLIN, RAFTER, BUIGE, VALLEY OR HIP RAFTER NOTCHED & ANKLED W/ A-34 CLIP

2' O.C.

BRACE TOP OF MICROSLAT AT O.C. FROM OTHER STRUCTURE & ATTACH W/ A-34

NOTE: BRACE MAY TIE IN FROM THE SIDE OR 90 OVER THE TOP OF THE MICROSLAT



1 1/2" x 16" MICROSLAT

BRACE MUST BE ATTACHED TO STRUCTURE IT IS BRACING

NOTE: AS WITH MEMBLS AND BRIDGE BRACES, VALLEY & HIP RAFTER BRACES SHOULD PROVIDE DIRECT BEARING SUPPORT. (SEE PURLIN BRACE DETAILS)



Calculation for the required section modulus and moment of inertia for simple span wood beams. Dead load(dl) and Live load(ll) are in pounds per square ft., Spans(l) and Tributary load length or spacing(sp) are in ft., Section moduli are in inches cubed and Moments of inertia are in inches to the 4th power. Allowable stress (Fy) is in lbs./sq. in. per Manufacturer's specifications. Section modulus shape factor reduction and load modification are per U.B.C. 1994 edition.

MICROLAM BEAM

rdl := 12 rll := 16 rta := 6 l := 21
 fdl := 8 fll := 40 fta := 0/2 rta · l := 126
 Wdl := 16 · 1.75 / 144 · 35 Wdl = 6.806 I = 2000000 F_b := 2800 · 1.25

Beam stability factor per 1991 NDS 3.3.3: L_u := 48 L_e := 1.84 · L_u b := 1.75 d := 16

$R_b := \left[L_e \frac{d}{b^2} \right]^5$ K_{be} := 609 F_{bE} = K_{be} · $\frac{E}{R_b^2}$

$C_L := \frac{1 + \left(\frac{F_{bE}}{F_b} \right)}{1.9} - \left[\frac{1 + \left(\frac{F_{bE}}{F_b} \right)^2}{1.9} - \frac{F_{bE}}{F_b} \right]^5$ C_L = 0.681



wt := rta · (rdl + rll) + fta · (fdl + fll) + Wdl

S min. required = $(wt) \cdot l^2 \cdot \frac{1.5}{F_b \cdot C_L} = 48.49$

I min. required = $5 \cdot (wt) \cdot \frac{(l \cdot 12)^4}{12 \cdot 384 \cdot E \cdot 1 \cdot \frac{12}{360}} = 546.37$

Use 1-3/4" x 11-7/8" MicroLam beam

$S = C_f \cdot b \cdot \frac{d^2}{6}$ $I = b \cdot \frac{d^3}{12}$ $C_f := \left(\frac{12}{d} \right)^{1/9}$

S = 72.318 > 48 I = 597.333 > 546 therefore 1-3/4" x 11-7/8" MLB is O.K.

1.5 · 48.49 = 72.735
 5 · 546.37 = 2731.85
 72.735 > 72.318
 2731.85 > 597.333
 therefore 1-3/4" x 11-7/8" MLB is O.K.

SUNSLATES™ INSTALLATION MANUAL



PART NUMBER # MN100



- Startle reaction hazard.
- Do not install in wet or damp conditions
- Always keep SUNSLATES™ clear of debris
- Wear safety glasses when handling this product

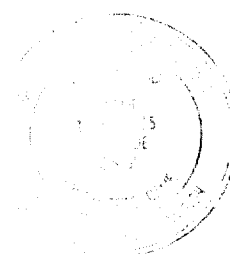
CAUTION:

- Exposed live parts until installation is complete.
- Use non-conductive ladders.
- Do not walk on SUNSLATES™
- Use insulated and appropriate installation tools.



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4610 NORTHGATE Blvd. 150, SACRAMENTO, CA 95834
TEL: 916 920 9500 FAX: 916 927 1697

e-mail: support@atlantisenergy.com



1. Introduction

Atlantis Solar Systems provides these guidelines for the installation of PV Roofing Slates to assist the applicator in effecting an efficient and workman-like application. Although this manual provides details for typical conditions encountered on slate applications, all application details are beyond the scope of this text. When encountering any conditions not illustrated in this manual, please contact Atlantis Energy, Inc. for assistance

All materials utilized in the construction, including fasteners, flashing, felts, under laymen's and penetrations should be selected to provide the same life (50 year life time expected). The installer must use all of the electrical materials (SUNSLATES™, cables, junction boxes, inverters, connecting technique) specified in this manual and project documents. Artificially concentrated sunlight shall not be directed on the module. Failure to conform to these Installation Guidelines will void the Atlantis Energy or Eternit Warranty

This product is Listed to applicable UL Standards and requirements by Underwriters Laboratories Inc.

UL LISTED 1703 Photovoltaic Module (class A)

UL LISTED 790 Roofing Material Fire Rating (class A)

2. SUNSLATES™ and SUNSLATES™ string (field) electrical characteristics

The electrical characteristics are within +10 percent of the indicated values of Isc, Voc and Pmax under standard test conditions (1000 W/m² irradiance, 25 deg C (77 deg F) cell temperature and AM 1.5 spectrum). Under normal conditions, the SUNSLATE™ is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions (output may vary depending on time of day, time of year, ambient conditions, ambient temperature and shading). Accordingly, the value of Isc and Voc marked on the SUNSLATE should be multiplied by a factor 1.25 when determining component voltage ratings, conductor ampacities, fuse size and the size of controls connected to the PV output.

2.1 SUNSLATE™ electrical characteristics

There are six (6) crystalline PV cells, connected in series, in each SUNSLATE™.

Model	Pmax Watts	Vmax Volts	Voc Volts	Imax Amps	Isc Amps
AP-H	12.20	2.90	3.60	4.21	4.70
AP-G	12.00	2.90	3.60	4.14	4.60
AP-F	11.80	2.85	3.55	4.14	4.40
SX-D	11.60	2.86	3.64	4.07	4.58
SX-E	11.00	2.82	3.63	3.93	4.39
SM-II	12.20	2.86	3.67	4.30	4.72

AP - Astropower cell, SX - Solarex cell, SM - Siemens cell

VER 02/10/99 IMG
 violation of any other applicable laws



2.2 SUNSLATE™ string (field) electrical characteristics

When running a 48 Volts DC nominal utility-connected PV system, each series string (field) must have, either 18, 19 or 20 SUNSLATES™ Series fuse size @ 8 Amps per series string.

A string of 18 SUNSLATES™ in series

SUNSLATE™ Model	Pmax Watts	Vmax Volts	Voc Volts	Imax Amps	Isc Amps
AR-H	219.6	52.2	64.8	4.21	4.70
AR-G	216.0	52.2	64.8	4.14	4.60
AR-F	212.4	51.3	63.9	4.14	4.40
SX-D	208.8	51.5	65.5	4.07	4.58
SX-E	198.0	50.7	65.3	3.93	4.39
SM-II	219.6	51.5	66.0	4.30	4.72

A string of 19 SUNSLATES™ in series

SUNSLATE™ Model	Pmax Watts	Vmax Volts	Voc Volts	Imax Amps	Isc Amps
AR-H	231.8	55.1	68.4	4.21	4.70
AR-G	228.0	55.1	68.4	4.14	4.60
AR-F	224.2	54.2	67.5	4.14	4.40
SX-D	220.4	54.3	69.2	4.07	4.58
SX-E	209.0	53.6	68.9	3.93	4.39
SM-II	231.8	54.3	69.7	4.30	4.72

A string of 20 SUNSLATES™ in series

SUNSLATE™ Model	Pmax Watts	Vmax Volts	Voc Volts	Imax Amps	Isc Amps
AR-H	244.0	58.0	72.0	4.21	4.70
AR-G	240.0	58.0	72.0	4.14	4.60
R-F	236.0	57.0	71.0	4.14	4.40
SX-D	232.0	57.2	72.8	4.07	4.58
SX-E	220.0	56.4	72.6	3.93	4.39
SM-II	244.0	57.2	72.8	4.30	4.72

This set of instructions is intended to assist you in the proper installation of the product. It is not intended to be a substitute for the manufacturer's instructions. The manufacturer's instructions should be read and followed carefully. The manufacturer's instructions should be read and followed carefully. The manufacturer's instructions should be read and followed carefully.

VER 02/10/99 TMG



2.3 Battery charging systems

The following configuration applies, one series string (field) will have:

12 Volts DC nominal

6 (six) SUNSLATES™ in series

SUNSLATE™ Model	Pmax Watts	Vmax Volts	Voc Volts	Imax Amps	Isc Amps
AR-H	73.2	17.4	21.6	4.21	4.70
AR-G	72.0	17.4	21.6	4.14	4.60
AR-F	70.8	17.1	21.3	4.14	4.40
SX-D	69.6	17.2	21.8	4.07	4.58
SX-E	66.0	16.9	21.8	3.93	4.39
SM-II	73.2	17.2	22.0	4.30	4.72

24 Volts DC nominal

12 (twelve) SUNSLATES™ in series

SUNSLATE™ Model	Pmax Watts	Vmax Volts	Voc Volts	Imax Amps	Isc Amps
AR-H	146.4	34.8	43.2	4.21	4.70
AR-G	144.0	34.8	43.2	4.14	4.60
AR-F	141.6	34.2	42.6	4.14	4.40
SX-D	139.2	34.4	43.6	4.07	4.58
SX-E	132.0	33.8	43.6	3.93	4.39
SM-II	146.4	34.4	44.0	4.30	4.72

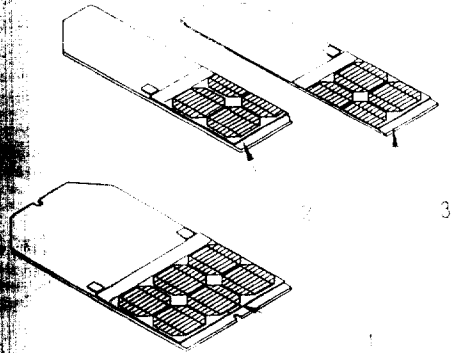
48 Volts DC nominal

24 (twenty-four) SUNSLATES™ in series

SUNSLATE™ Model	Pmax Watts	Vmax Volts	Voc Volts	Imax Amps	Isc Amps
AR-H	292.8	69.6	86.4	4.21	4.70
AR-G	288.0	69.6	86.4	4.14	4.60
AR-F	282.2	68.4	85.2	4.14	4.40
SX-D	278.4	68.8	87.2	4.07	4.58
SX-E	264.0	67.6	87.2	3.93	4.39
SM-II	292.8	68.8	88.0	4.30	4.72

Atlantis Energy recommends that all system components, including batteries and electronic devices be listed by a nationally recognized laboratory.

No Power SUNSLATES™ (NP) are used for aesthetic purposes. There is no electrical performance from the NP SUNSLATES™.
Figure 4



- 1 NP SUNSLATE™
- 2 Left NP SUNSLATE™
- 3 Right NP SUNSLATE™

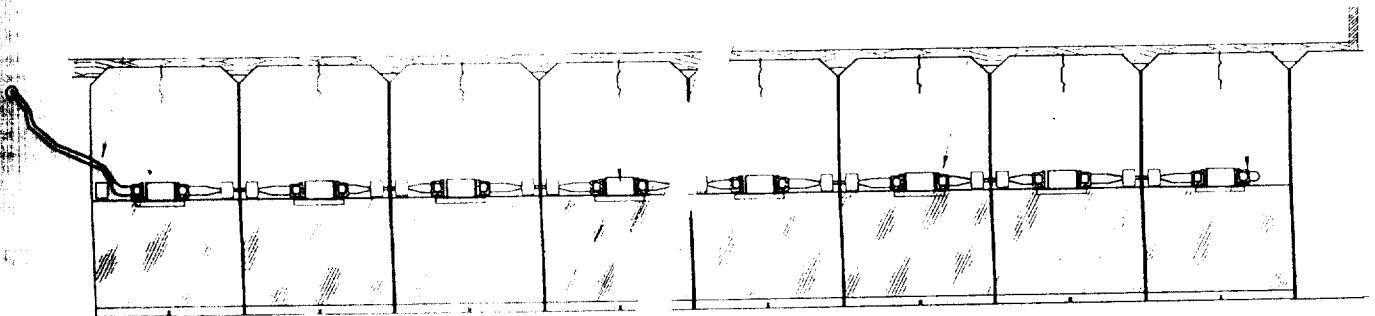
Figure 4

STEM

Field (String) - The building (roof) on which the SUNSLATES™ are installed is setup from SUNSLATE fields (strings). All the fields are installed with an equal number of SUNSLATES™ in them. The field has a beginning (bridge cable) and an end (field connecting cable). When installing the field, always start (first SUNSLATE from the string) with field connecting cable (which goes through the roof into the building) and end with the bridge cable. The "System Design" document (see appendix 2), will show how many fields are needed and the position of every field.

Reference part list fig 1 sec.3

- | | | | |
|------------------|-------------|---------------------------|-------------------|
| Field Cable (#5) | Shield (#6) | Inteconnecting Cable (#3) | Bridge Cable (#2) |
|------------------|-------------|---------------------------|-------------------|



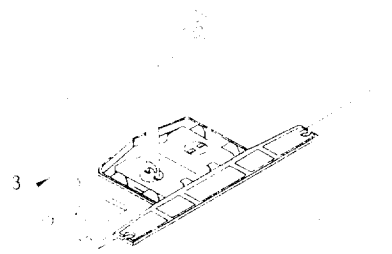
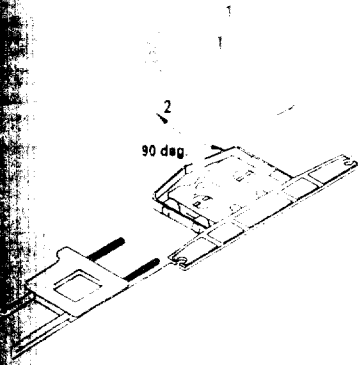
SUNSLATE™ Field (String)

The purpose of this document is to provide the user with the necessary information to install the SUNSLATE™ system. This document is intended for use by qualified personnel only. The user shall be held responsible for any violation of any City, State or Federal law.

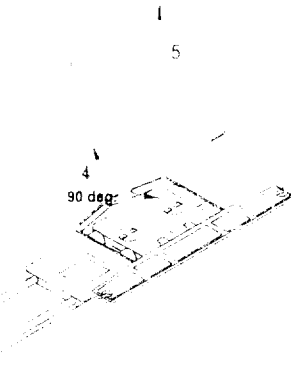
4.2 SUNSLATES™ connections.

To open connector

1. Place the tool in the connection box
2. Turn the tool 90 degrees. **OPEN**

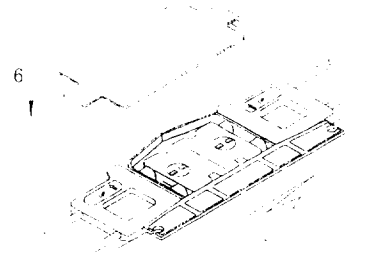


3. Place the cable in the connection box
Be sure to fully seat connector.
Gasket at base of pins must snap in



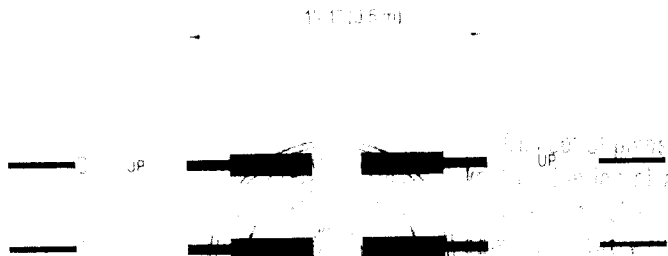
To close connector

4. Turn the tool 90 degrees. **CLOSED**
5. Remove the tool.



6. After the connectors are closed, place the shield over the connection box and push it down, firmly seating the shield.

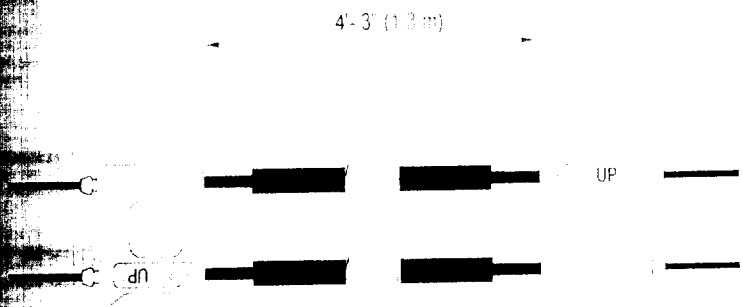
4.3 SUNSLATE™ to SUNSLATE™ horizontal cable (SUNSLATE™ inner-connecting cable)



The number of SUNSLATES™ in the field will be specified in the "System Design" document (see appendix 2) for the particular project (the most common number of SUNSLATES™ in a field is 18, 19 or 20 for crystalline cells). One SUNSLATE™ includes the interconnecting cable for the connection between the modules.



Row to row cable - Twister cable



The function of the Twister cable is for row to row connections inside the SUNSLATES™ field. We use the Twist cable when one field does not fit in one row and has to be connected with the next row (figure 4) of SUNSLATES™. (The roof plan shows the row to row connection location).

Before installing the next row of SUNSLATES™, the installer has to check that all of the connection boxes are in a closed position, and check the field voltage (see field checking example sec 5 - page 9).

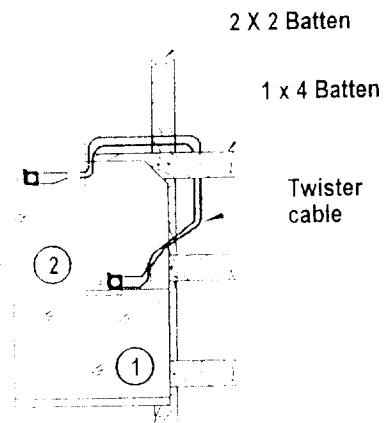
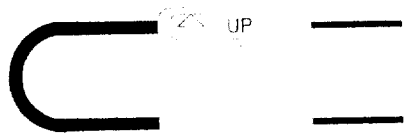


Figure 4

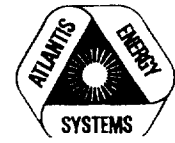
4.5 Bridge cable



The function of the Bridge is to close the electrical circuit of the SUNSLATES™ field. It is connected to the first SUNSLATE™ of the field. The Bridge is also used for field testing (see point 5).

This set of plans and specifications must be kept on the job at all times and it is prohibited to make any changes or alterations to the same without written permission from the Building Inspection Division.

The approval of this proposal and the fact that SHAIL NOT be held liable for any violation of any City Ordinance or Building Code.



Field to junction box connection

4' 3" (1.3 m)

The field cable is placed at the beginning of the field (the first SUNSLATE™) and after checking the field voltage (see field checking example - page 4) the cable is placed through a hole (min Ø 0.5") on the roof - then the installation of the next field may begin. The field cable has two wires – a positive and a negative end.
 (custom (longer) field cables may be designed if roof penetrations are impossible, or if only one roof penetration is needed

All cables for the installation (inner-connecting cable, bridge cable, twister cable and field cable) supplied by Atlantis are: 14 AWG, single conductor, stranded, double insulation, sunlight resistant, type UF (UL) 600 Volts

The home run cable (from junction box to inverter) is to be type THHN, NM-B* or similar. All cables are to be chosen referring to the NEC for the given installation environment.

Size AWG	Maximum length (two conductors)*
	Feet
12	34
10	50

- based on 1.3% Power loss @ 149°F per series field
- If longer cables are needed please contact Atlantis for assistance

The electrician will make the connections under the roof (in the building). The field cable, which has been placed by the roofer through the hole on the roof, has to be connected in a junction box (via terminal strips, 10A) to a standard NM-B* nonmetallic sheathed cable. That cable must be connected in the inverter. Seal the hole in the roof from the inside with the fire stopping expanding foam or silicon seal. (figure 5)

The fire stop sealant shall be a one-part, neutral curing silicone sealant. The sealant shall be completely water resistant and shall contain no solvents nor inorganic fibers of any kind. The through-penetration fire stop sealant shall allow movement of ±25% and shall be UL Classified and/or FM Systems Approved and tested to the requirements of ASTM E814 (UL1479)
 Recommended silicon sealant PenSIL® 300 (PEN300)

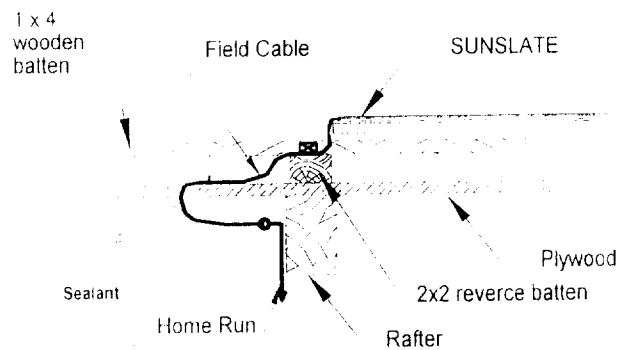


Figure 5

The field cable has to be secured with a cable clamp, for strain relief, on to the nearest 2x2 vertical batten. The electrician (installer) shall refer to section 690-8 of the National Electric Code for an additional multiplying factor of 125 percent (80 percent derating) which may be applicable.

CAUTION! Do not connect more than three (3) field cables in parallel before inverter (if needed contact Atlantis Energy for support). Make sure that the DC positive goes to the positive terminal of the inverter and the DC negative goes to the negative terminal of the inverter. Test the field polarity prior making any connection.

* Refer to NEC for cable type in given environment. If different cable type is to be installed contact Atlantis for assistance.



5. Field checking (Row-Checking).

The most common error made is that the SUNSLATES™ connection box is not in a closed position. The installer must perform row - checking to insure that each SUNSLATES™ connection boxes are closed and making electrical contact. Every field must be checked for open circuit voltage before the row is covered.

Checking is performed using a simple DC voltmeter:

Determine the open circuit voltage (Voc) shown in the "System Design" document (see appendix 2)" on the first page. The most common Voc for crystalline cells is 3.7 [VDC], however, that number may change as the SUNSLATE™ temperature change. Therefore, when we measure the fields, we must be sure that all the fields Voc are the same or the difference is not greater than 3 [VDC]. Shadows from instruments or cables over the SUNSLATE™ will cause the voltage to drop, be sure that there are no shadows when testing the field

Example:

If one field is 20 SUNSLATES™ in series, the Voc = $3.7 \times 20 \pm 3$ [VDC] = 74 ± 3 [VDC]

If all the fields have Voc= 74 [VDC], then everything is properly connected. If one of the fields has Voc= 70 [VDC] and all the others have Voc= 74 [VDC], then one SUNSLATE is badly connected and the roofer has to go back and check the bad field for 1) a junction box which is not closed or 2) a bad SUNSLATE. If the bad field does not give any Voc then there is a bad connection in the field and the series circuit is not closed

To find the bad SUNSLATE the easiest way is to start checking the field by dividing it by two (disconnect, put a bridge cable on the left part and check the voltage of that part). You have to calculate the Voc for all the variations.

Example 20 SUNSLATES™ Voc=74 [VDC]	10 SUNSLATES™ Voc=37 [VDC]
5 SUNSLATES™ Voc=18.5 [VDC]	3 SUNSLATES™ Voc=11.1[VDC]
2 SUNSLATES™ Voc=7.4 [VDC]	1 SUNSLATES™ Voc=3.7 [VDC]

...the voltage of the field is ...
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6. SUNSLATES™ Roofing Product Information

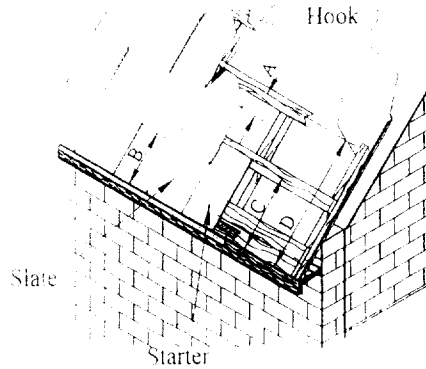


Figure 7

	Eternit Slate	SUNSLATE™
Headlap (A)	5"	5"
Exposure (B)	11 3/8"	11 3/8"
Starter Height (C)	16 1/2"	16 1/2"
Slate Height (D)	28 3/8"	28 3/8"
Storm Anchor Location (Hook) (E)	7 7/8"	7 7/8"
Slates/Square	77	77
Weight/Square	500 lbs.	720 lbs.
Slates/ Crate**	56	22
Squares/ Crate**	0.73	0.28
Weight/ Crate**	380 lbs.	230 lbs.

**The crate dimensions are 2'-6" x 1'-2" x 1'-6" (L x W x H).

DO NOT INSTALL OR HANDLE SUNSLATES™ IF SURFACE IS WET OR DAMP

VER 12/07/98 TMG



7. STORAGE AND HANDLING

7.1 Storage

The SUNSLATE™ and roofing slates are delivered in crates.

The crate dimensions are 2'-6" x 1'-2" x 1'-6" (LxWxH).

Store Eternit Slates and SUNSLATES™ in a clean, dry, well ventilated area protected from the weather and other trades. As soon as the slates have been delivered and stored under cover, split the plastic wrap to allow for ventilation to prevent excessive water condensation. If the slates should get wet in storage, efflorescence is likely to occur. Mild efflorescences of the slates will usually disappear over a period of time. Severe efflorescences may require special treatment. Contact the Technical Department at Eternit Inc. or Atlantis Energy Inc. for details.

Do not handle SUNSLATES™ in rainy or wet weather conditions (water is not allowed in the connection box before installing the SUNSLATES™).

Cutting Tools

Unlike other mineral fiber cement slates, Eternit Slates can be cut and punched with a slater's hammer.

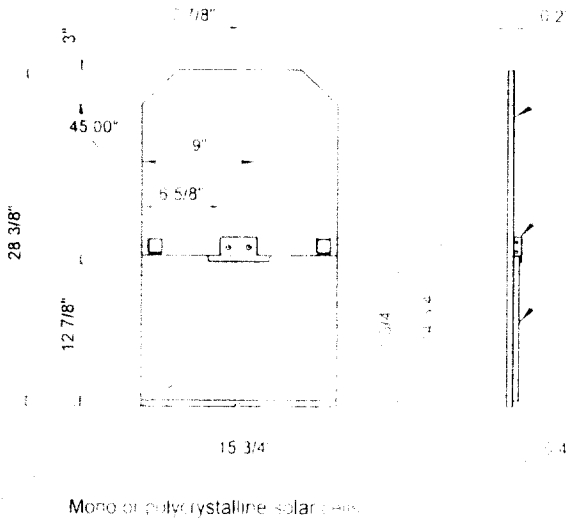
For rapid and efficient cutting, punching and notching, a portable slate cutting machine may be utilized. Interior cuts in the slate can be accomplished with a pin punch and hammer. Individual slates can be faced, scored and snapped over a straight edge. Eternit Slates can be field cut to provide an interesting feature to the completed roof utilizing a slater's cutter.

7.2 Uninstalling and replacing a SUNSLATE™

Before disconnecting the SUNSLATE™ the DC disconnect switch at the inverter must be in OFF position. Bend the hook which holds the slate at the bottom with the roofers hammer, then slide the slate down until you see the SUNSLATE™ junction box. Open the connectors and pull out the inner-connecting cables, the SUNSLATE™ will then slide down and can be removed. Replace with new SUNSLATE™ by sliding it up between the slates and then connect the inner-connecting cables (see 4.2). The hook has to be then bent back to secure the slate.



8. Application



- 3
- 2
- 1

SUNSLATES™ are a roofing and façade material, which uses solar energy to produce electrical power for the building's use. SUNSLATES™ are composed from 1) a solar module, 2) connection box and 3) *Eternit* slate. The solar module and the connection box are laminated together and then glued to the surface of the slate. SUNSLATES™ are installed by the technique (double overlap system) provided from the *Eternit* Company. SUNSLATES™ are a light concrete roofing material and have passed all of the roofing tests made by the *Eternit* Company. SUNSLATES™ are a UL listed product.

Installation of the double overlap system

The double overlap system is a method of cladding thin panels fixed to battens. This method of cladding is characterized by the fact that at every point on the surface there are at least two layers of slate.

To get a good water and airtightness, an underlay of roofing-felt, battens and counter (reverse) battens are necessary.

Roofing Felt

One layer of 30 lb. felt. In some areas an underlayment of an approved modified bitumen or other high performance underlayment may be desired as an upgrade.

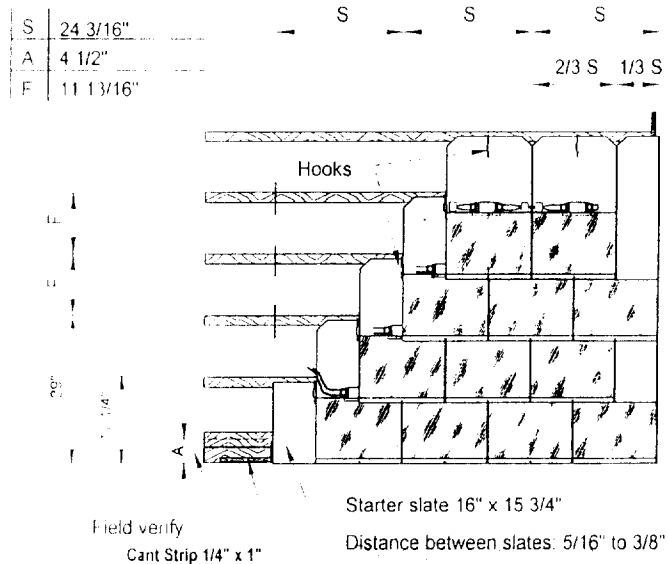
Reverse Battens

Fix battens to conform to chalk lines securing at not more than 24" on center using 0.121" x 1 1/4" corrosion resistant nail or #10 x 1 1/2" plated deck screw.

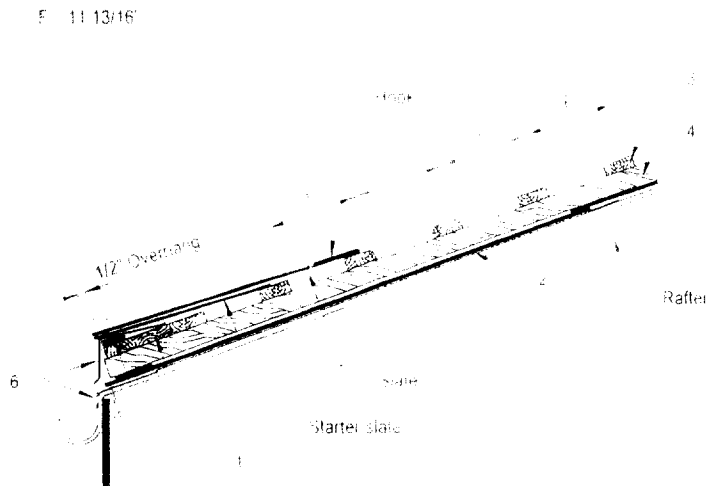
Battens

Fix reverse battens to conform to chalk lines securing at not more than 11 3/8" on center using 0.121" x 1 1/4" corrosion resistant nail or #10 x 1 1/2" plated deck screw

FRONT VIEW



SIDE VIEW



For every whole slate/ SUNSLATE there has to be one hook.

The half or cut slate and the slates, which are on the edges of the roof/façade, have to be nailed or screwed to the battens.

Do not nail the SUNSLATE unless they are cut or are placed on the edge of the roof.

The hook must be nailed directly to the battens. If the hook has a tilt in the battens direction the space between slates will get bigger with every next slate.

If the row is not straight, use a chalk line to mark the position of the hook.

1. Starter batten - 1x8 or two 1x4
2. Plywood - 5/8 or 1/2 CDX
3. Batten - 1/4
4. Reverse batten - 2x2
5. Cant strip
6. Drip edge

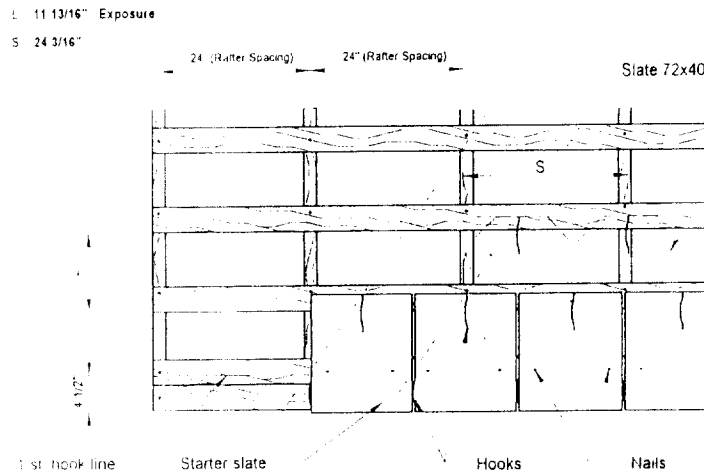
Every slate on the roof has to be strengthened by a hook.

Fixing the starters and the first course

The starter slates and first row of hooks are the most important to ensure an aligned roof. The eaves course slate is a full slate whose length has been reduced by the gauge, i.e. actual length of eaves course slate is gauge plus lap. The starter course slate is secured by two nails and a hook on the top. Before installing the whole row, make sure that the hook line, for the hooks between the starters, is marked with chalk line. The distance between the slates must not be smaller than one hook thickness and not bigger than 1/4 hook thickness. After installing the starters measure the straightness of the first row of hooks with a chalk cord and a waterlevel.

The first course has to be installed using the first row of hooks and then nailing the slate hook.

STARTERS



ATLANTIS ENERGY, Inc. TMG. ©1999

4610 NORTHGATE Blvd. 150, SACRAMENTO, CA 95834

TEL: 916 920 9500 FAX: 916 920 1697 e-mail: support@atlantisenergy.com

Model SW

POWER CONVERSION

A Revolution in Power Technology

The result of new ideas and technologies, the Trace SW Series II delivers sine wave power without compromise. Now sine wave output with high efficiency, high surge ability and low idle current draw is available. More than just the finest inverter, with three microprocessors and bi-directional power topology, it has features and capabilities that previously were non-existent or available only as separate products.

New Series II Design

- Easier to use programming system with separate "User" and "Setup" menus.
- New backlight LCD display on the control panel improves use in low light conditions.
- Improved AC wiring access and AC conduit provisions makes installation easier.
- New "soft start" systems allows inverter to run even heavier loads and improves reliability.
- Includes a new, easier to read universal owners manual that covers all SW series II inverters.
- Enhanced generator start system works with a greater variety of generator types.

As an Inverter

- Multiple step, low distortion, sine wave output with up to 96% peak conversion efficiency. Very low idle current draw allows high efficiency even when powering small loads.
- Two inverters can be operated in series to provide 120/240 vac three wire output with twice the power for 240 VAC loads. Requires optional series interface cable.
- Adjustable search mode can reduce idle power draw to 1 watt when not operating AC loads.
- Adjustable low battery cutout voltage with adjustable time delay prevents damaging batteries.
- Protection circuitry guards against over-current, short circuit, over temperature, low battery and high battery conditions. Includes islanding protection for utility connected applications.

As a Battery Charger

- High efficiency, low current distortion design enables higher charger output from small generators.
- Three stage, temperature compensated charging algorithm ensures maximum battery life. Remote battery temperature probe is standard. Includes manual equalize mode with adjustable settings.
- Adjustable grid and generator size allows matching of charger to the AC source.
- Automatic "back-off" system prevents overloading of generators or nuisance tripping of input breakers.

When connected to grid or generator, the SW Inverter synchronizes its waveform to that of the AC source, locks to it and operates in parallel. This ability, coupled with the bi-directional power topology and microprocessor control makes it possible for the unit to offer multiple operating modes:

Generator Support Mode: When charging from a generator, the generator's output voltage and current are monitored. If either falls outside user programmable limits, the unit sheds itself as a load and then reverts to generator flow if necessary. This delivers energy from the generator to the loads assisting the generator. When operating in parallel series at 240 VAC, one 120 VAC leg can be supported while the other is supporting

Standby Power Mode: Two modes are provided - one for generator and one for utility. In AC fails, transfer to inverter power (switching time is 100 milliseconds). If the grid and generator are connected, the unit will attempt to start the generator after the grid fails. When the generator returns, the generator is automatically shut down and the unit is synchronized to the grid and the inverter supports the loads.

Battery Voltage Mode: When the batteries are low, a low battery set point will allow the unit to connect to the grid.

Generator Start Mode: Generator start features are standard and user programmable. Gen start can be triggered by battery voltage or load size connected. A "quiet time" can be set to restrict generator operation when absolutely required. The start sequence is fully adjustable and is now compatible with a greater variety of generator types. Generator must be set up for remote starting and designed for unattended operation.



THE POWER COMPANY
Trace
ENGINEERING

Model SW Series

SPECIFICATIONS

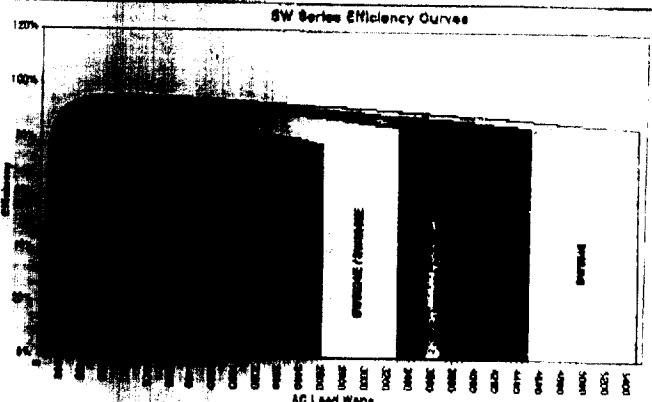
Operating as a bi-directional battery charger, power from any source that tries to charge the batteries is delivered to the grid. A GRID USAGE TIMER can be programmed to allow power to the utility only during prescribed hours. Sell back current is adjustable. **Must have approval of local utility company.**

(1) The sine wave series may be programmed to operate from batteries during a power outage. Batteries may be charged during lower rate periods. (2) During a programmable power outage, power is delivered to the grid from the batteries. An alternative (lower) adjustable float voltage can be programmed to control the battery discharge depths.

Three user programmable controlled signal relays are provided to control charging sources and loads.

Selection of charging and adjusting parameters are easily accomplished by moving thru a menu tree that is displayed on the unit's LCD read-out. Doubling as a meter, the LCD displays INVERTER AMPS, INVERTER VOLTS DC and INVERTER VOLTS AC. Additionally, control panel LED's report the status of the system.

Series	SW2612E	SW4024	SW3024E	SW4048	SW3048E	SW5548	SW4548E
DC Output	12 VDC	24 VDC	24 VDC	48 VDC	48 VDC	48 VDC	48 VDC
AC Input	120 VAC	120 VAC	230 VAC	120 VAC	230 VAC	120 VAC	230 VAC
Frequency	60 Hz	60 Hz	50 Hz	60 Hz	60 Hz	60 Hz	60 Hz
Continuous Power	2600 VA	4000 VA	3000 VA	4000 VA	3300 VA	5500 VA	4500 VA
Continuous Current	11 amps	17 amps	14 amps	17 amps	14 amps	23 amps	20 amps
Maximum Current	20 amps	28 amps	24 amps	28 amps	24 amps	38 amps	34 amps
Efficiency	96%	94%	94%	95%	95%	98%	98%
Startup Current	30 amps	40 amps	31 amps	40 amps	30 amps	60 amps	30 amps
Maximum Current	150 amps	120 amps	100 amps	80 amps	80 amps	50 amps	80 amps
DC Input							
Search Mode	0.04A (1W)	0.04A (1W)	0.04A (1W)	0.025A (1W)	0.025A (1W)	0.04A (1W)	0.04A (1W)
On (no load)	0.6A (12W)	0.66A (16W)	0.65A (16W)	0.33A (16W)	0.33A (16W)	0.40A (20W)	0.40A (20W)
At Full Load	3.00A (36W)	2.00A (24W)	1.66A (20W)	1.00A (12W)	1.00A (12W)	1.37A (16W)	1.06A (12W)
Short Circuit	1000 amps	360 amps	320 amps	180 amps	180 amps	180 amps	138 amps
Normal DC Input	11.8 to 18.5	22 to 32	22 to 32	44 to 66	44 to 66	44 to 66	44 to 66
AC Output	Sine wave, 14 to 52 steps per cycle						
AC Output Frequency	± 2%						
Voltage Regulation	± 1% (no load) ± 0.5% (load)						
Total Harmonic Distortion	≤ 3%						
Power Factor	1 to 1						
Frequency Response	± 0.5% (load) regulated						
Load Sensing Range	18 to 240 Watts						
Options	SWRC	SWRC	SWRL	SWPL	SWAL	SWRC	SWRC
Remote Control Panel (SWRC)	No	Yes	No	Yes	No	Yes	No
Stacking Interface for Remote Panel (includes two relays)	SIY	SIY	SIY	SIY	SIY	SIY	SIY
Conduit Box	BCS-40	BCS-40	BCS-40	BCS-20	BCS-20	BCS-40	BCS-40
DC Disconnect Breaker	DC 250	DC 250	DC 250	DC 175	DC 175	DC 250	DC 250
DC Battery / Inverter Cables	BCS-40	BCS-40	BCS-40	BCS-20	BCS-20	BCS-40	BCS-20
Enclosure Type	Indoor, ventilated, steel chassis with powdercoat finish						
Specified Temp Range	32° F to 104° F (0° C to 40° C) (output will meet specified tolerances)						
Allowed Temp Range	-40° F to 140° F (-40° C to 60° C) (output may not meet specified tolerances)						
Dimensions - Inverter Only	18" (46 cm) high, 22.5" (57 cm) wide, 9" (23 cm) deep (when wall mounted)						
Dimensions - Shipping	20.5" (52 cm) high, 27" (69 cm) wide, 13.5" (34 cm) deep						
Mounting	Wall or Shelf Mount						
Weight - Inverter Only	26 lbs (12 kg)	40 lbs (18 kg)	30 lbs (14 kg)	40 lbs (18 kg)	30 lbs (14 kg)	55 lbs (25 kg)	45 lbs (20 kg)
Weight - Shipping	31 lbs (14 kg)	45 lbs (20 kg)	35 lbs (16 kg)	45 lbs (20 kg)	35 lbs (16 kg)	60 lbs (27 kg)	50 lbs (23 kg)
Other Voltage/Frequency for export are as follows:	SW3024J=105VAC/50Hz SW4024K=105VAC/60Hz SW4024W=220VAC/60Hz (two wire output only) SW4548A=240VAC/50Hz						



*specifications may change without notice
 Options: Remote control panel (SWRC), stacking interface cable (SIY), conduit box for code approved DC input battery cables (SWCB).
 ARLINGTON WA USA www.traceengineering.com

THE POWER COMPANY
TRACE
 ENGINEERING
 Available From:

SUNSLATE Feed Cables
From Fields to Inverter

Cable type TC
THHN or THWN
SUN RES. CIR BUR
AWG #12

DO NOT COMBINE CABLES

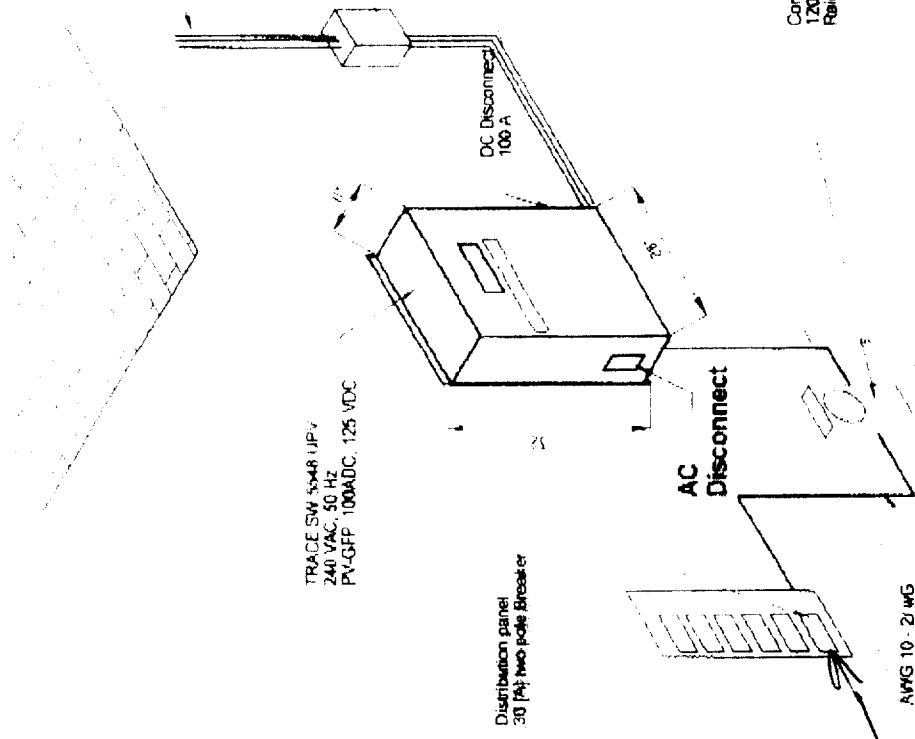
Pull Box (optional)

The cables from the roof are to be spliced
in the box to a #12 AWG ROLMEX cable
Metal box has to be grounded

Pre-installed #12 AWG indoor cable

All cabling shall be installed referring to the NEC
For installation instructions refer to part producer
recommendations

Combination Service Entrance Device
120/240 V, 100A
Rainproof Type 3R Enclosure Surface Mount



All Ladders, hurr, Roof penetration to inverter and
from inverter to sub panel are located indoor

For Installation Refer to:
Inverter Owners Manual (Part#2031-6)
SUNSLATES Installation Manual (Part# MN1100)

J.L.M. 6-2-2000

**The approval of all Electrical Work
is subject to field inspections.**

*Back Fed breaker holddown
not required as per Don V.*

Permit 000 5817

Todor Galitiev Atlantis Energy, Inc.

Susan Ashworth

electr.skd