

Solar Z Technology Progress Update

“Bringing the power of the sun into your kitchen”



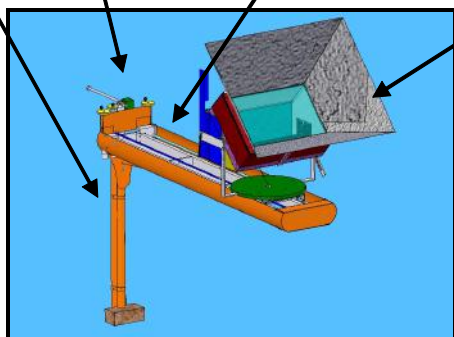
September 10, 2022

Model: 270i 1018 - LSST

PATENTS 9,644,864 / 10,247,447 / 11,365,902

- A new solar cooking appliance for the modern kitchen
- A complete solar cooking process *without leaving your kitchen*
- Mainstreaming solar cooking with a new kitchen appliance

Wall Mount / Controls (4X) / EPS (Extended Positioning System) / Box Solar Oven



Solar Z Unit



Solar Z Electronic Controller



Solar Z Installed

Also see history and further information of previous Press Releases, Patents, Animation Video, Promotional Video Interview, & Product Description Sheet for more Solar Z[©] Appliance information at
Wiki Web Page: solarcooking.org/solar_z

Solar Z[©] Milestones, Progress, & Evolution Continues:

- *A 3rd Solar Z[©] Patent (11,365,902) was allowed & issued* on 6/21/2022 at the U.S. Patent & Trademark Office covering the new design of the Solar Z[©] Electronic Controller with a new **“Approximation Tracking Technology” Open Loop system**. The patent covers the intellectual property of the innovative Solar Z[©] electronic controller design with all its features including a Sun tracking function fully motorized and operational from the kitchen.
- *1st Manufactured production of the Electronic Controller Beta units for the Solar Z[©] successfully completed* (electronic design / MFG of control Boxes / assembly) and are now ready for deployment with the Solar Z[©] model 1018-LSST Beta units. This now provides motorized electronic control and automation integrated into the Solar Z[©] at the next level. The new Electronic Controllers are now ready for deployment & placement for field testing and customer evaluation. Field site selections are now being pursued to get more product data.
- *Two more Manufactured production Beta test units of the Solar Z[©] model 1018-LSST* (with Lead Screw & Sun Tracking) with all the new engineering changes has been **successfully completed & ready for deployment** for customer field testing. The Solar Z[©] Beta units are assembled and prepared for field test and customer evaluation including factory Powder Coat Painting, new machined parts, and assembly now integrated for all mechanization enhancements to date.

- ***A new operator oven Loading Rack prototype design, fabrication, and process procedure to enhance “User Friendly” operation performance of the Solar Z[©] has been completed and now in the field testing process. Further appliance refinement and design continues for operator handling, loading, & unloading from the kitchen including using a loading rack, tongs, and other ergonomic solutions (testing & experimentation).***
- ***A new Solar Z[©] promotional video interview with Tom Hoffmann and a solar cooking marketing media colleague, Luther Krueger, discussing and showing the Solar Z[©] operating is completed and now on YouTube on the internet (see Solar Z[©] Wiki Web Page)***
- ***Financial seed funding continues; seeking more seed funding to further introduce, develop, and market the Solar Z[©] solar cooking appliance. The Solar Z[©] project has received more funding from seed contributors each year to support the project’s product appliance roll out.***
- ***Further ongoing Solar Z[©] product testing and data collection to “Burn In” field testing at the Laboratory continues. The performance results look very good moving towards integrated appliance success, (performance verification of all new engineering design changes required), 193 TEST COOKS with BETA UNIT model 1018 to DATE (9/8/2022)***
- ***Further appliance product design refinements & development enhancements continues including experimentation for outdoor weathering, wear robustness, mechanical integrity, and storage.***
- ***Continuing search & networking for Beta test sites to install Solar Z[©] units for customer evaluation and feed back. This is in progress in order to get customer response data on the Solar Z[©] as an appliance in an actual product use operational environment. This will provide important data collection and improvement feedback for continued product development.***

***Powder Coat Painting, Fabrication, and Assembly of Solar Z[©] 1018 Beta units
Accomplished with production manufacturers located in the Silicon Valley***

GMS (Group Mfg Services), San Jose, CA and Arenas Industrial Finishing Inc., San Jose, CA):

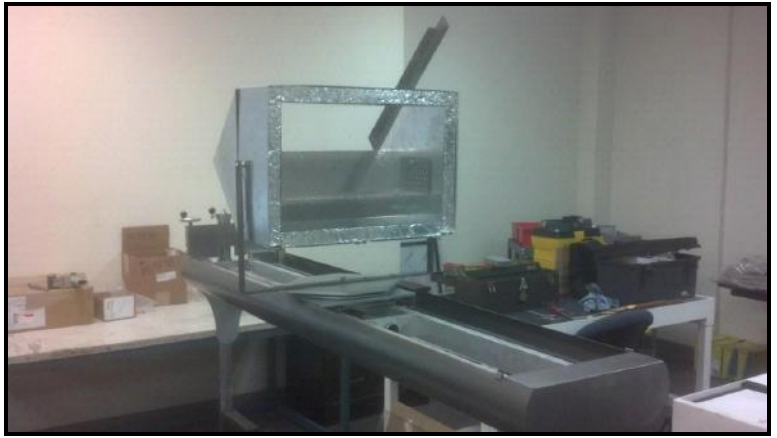
1st Manufacturing production of Solar Z[©] Parts at GMS;



***Powder Coat Painted Parts at Arenas Industrial Finishing; Staging, ready for shipment from
Production Factory (San Jose, CA) to TM Hoffmann Enterprises (Santa Cruz, CA)***



Solar Z[®] Assembly Begins at GMS Production Facility (San Jose, CA)



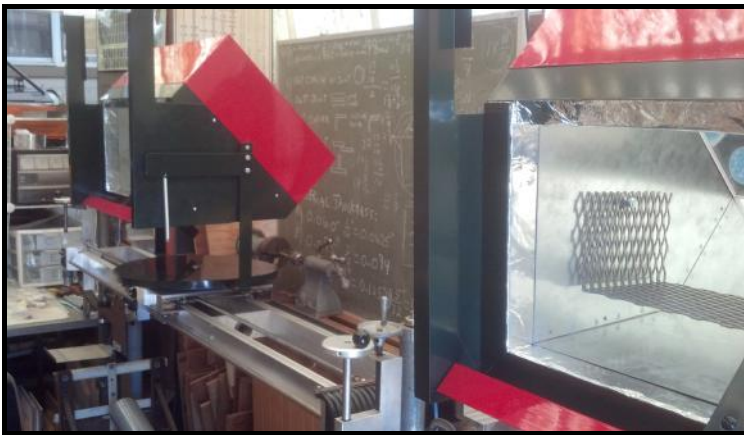
*Continuation of Assembly, Adjustment & 1st Painting at the Laboratory of
TM Hoffmann Enterprises (Santa Cruz, CA)*



*Solar Z[©] More Assembly begins at TM Hoffmann Enterprises Lab Facility
(Santa Cruz, CA)*



Solar Z[©] Assembly “Ramps Up” at TM Hoffmann Enterprises Lab Facility (Santa Cruz, CA)



Solar Z[®] Beta Units Assembled on Wheeled Assembly / Test Stands in Preparation for Transport to Beta Field Testing Sites (Santa Cruz, CA)



Solar Z© Electronic Controller

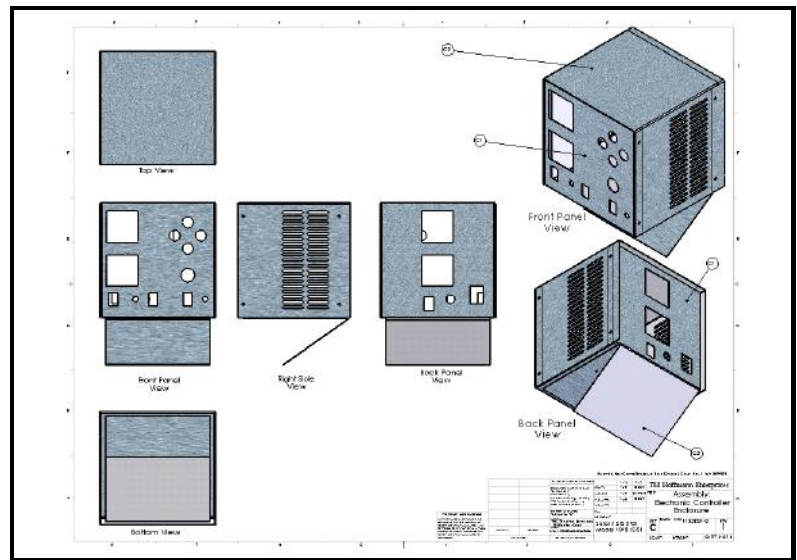
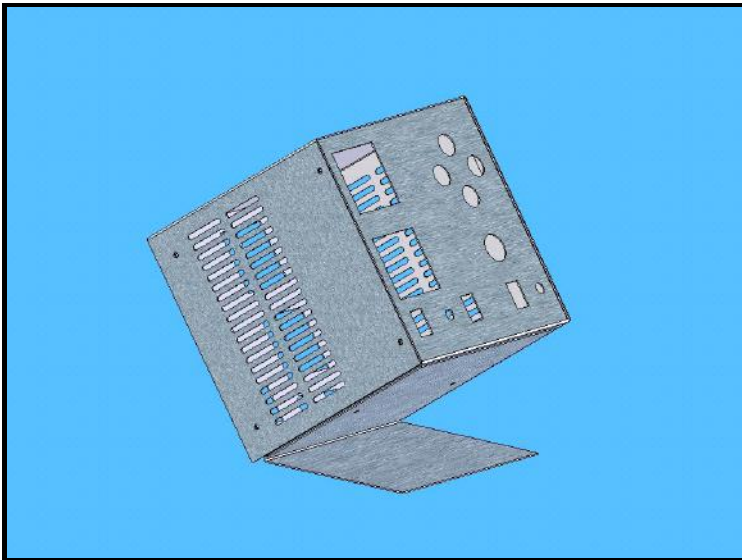
1st Manufacturing production (Beta Units)

New Patented Electronic Control Units for the Solar Z© model 1018-LSST

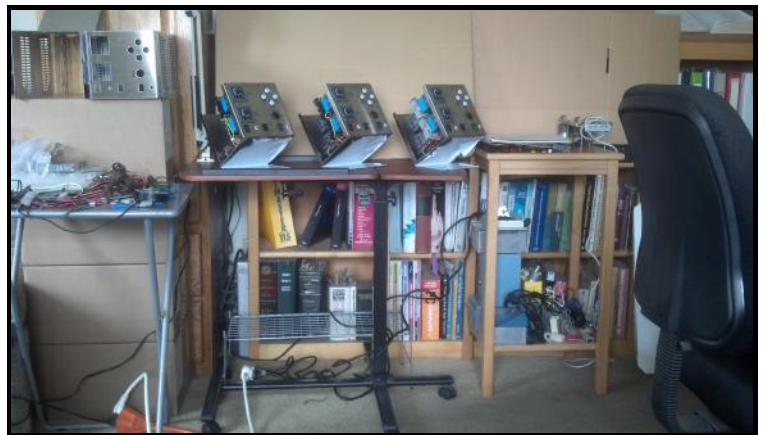
1st Manufacturing production fabrication & assembly of Beta units accomplished in Conjunction with the production manufacturer, GMS (Group Mfg Services), San Jose, CA located in the Silicon Valley with TM Hoffmann Enterprises.:

- **Controller Designed & Developed by TM Hoffmann Enterprises Engineering (Model Rev 5/R4) (at TM Hoffmann Enterprises, Santa Cruz, CA)**
- **Control Boxes Fabricated & Silk Screened Nomenclature by GMS Group Mfg Services, San Jose, CA (at production manufacturer Factory located in the Silicon Valley)**
- **Assembly & Wiring (Point to Point) performed by TM Hoffmann Enterprises Engineering (at TM Hoffmann Enterprises, Santa Cruz, CA Facility)**

Fabricated Electronic Enclosure Design with Console Stand



Solar Z© Electronic Controller production Wiring and Assembly

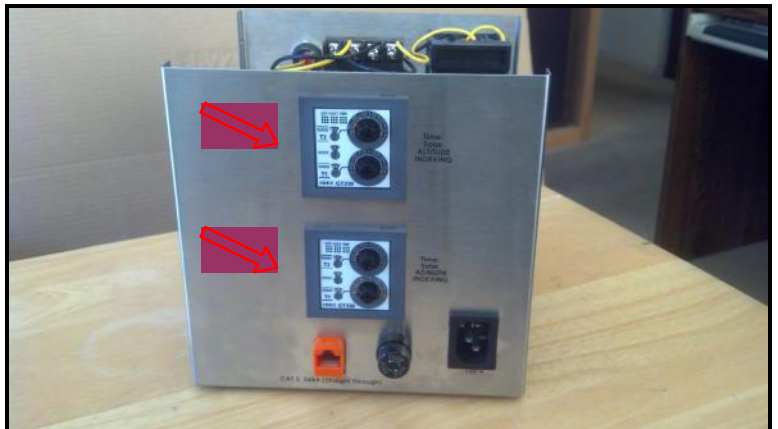




Solar Z[®] Electronic Controller Fully Assembled

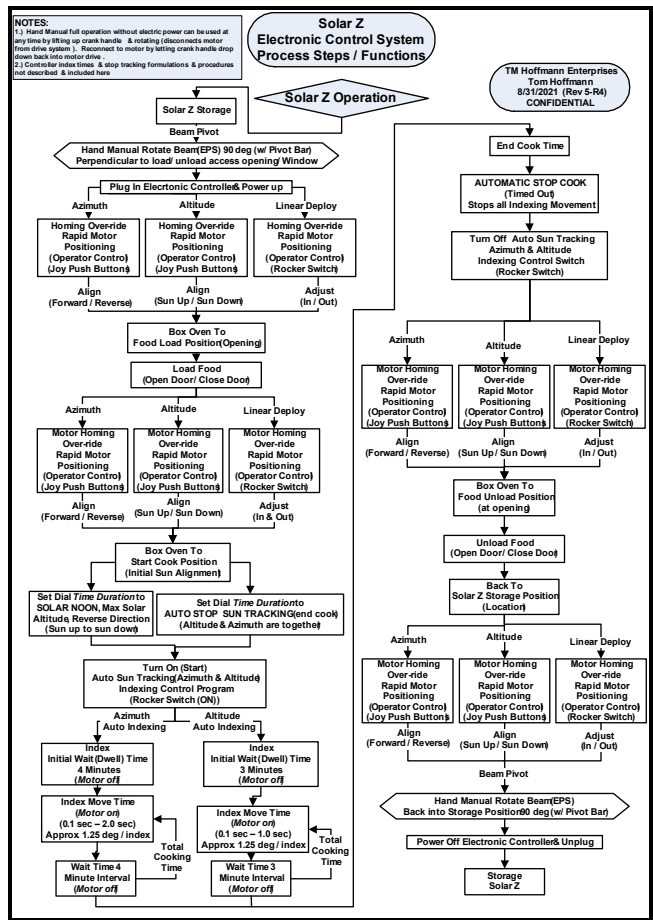
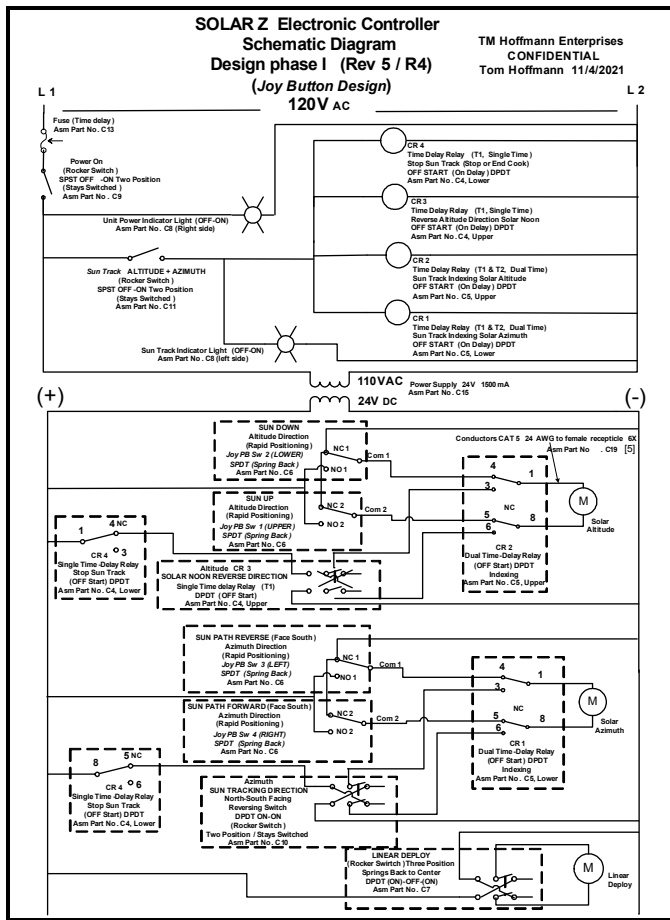


*Solar Z[®] model 1018-LSST (Model Rev 5/R4 Controller)
Control Unit Sun Track Index Adjustment (Back Panel) Controls for Solar Azimuth & Altitude
(see arrows)*



***New Patented Control Unit (model Rev5 /R4) for the Solar Z© model 1018-LSST
Stainless Steel (No. 4 Brushed) Box Enclosure with Silk Screened Nomenclature Designations
for Controls
(Rapid Positioning and Auto Sun Tracking)***



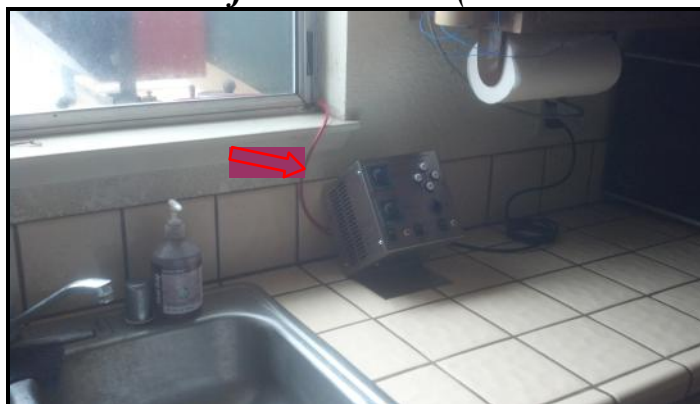


Solar Z[®] Electronic Controller
Testing and Evaluation

Operator Plugs in 6.5" x 6.5" x 6.5" Control Box Console (120 Volt, see arrow)



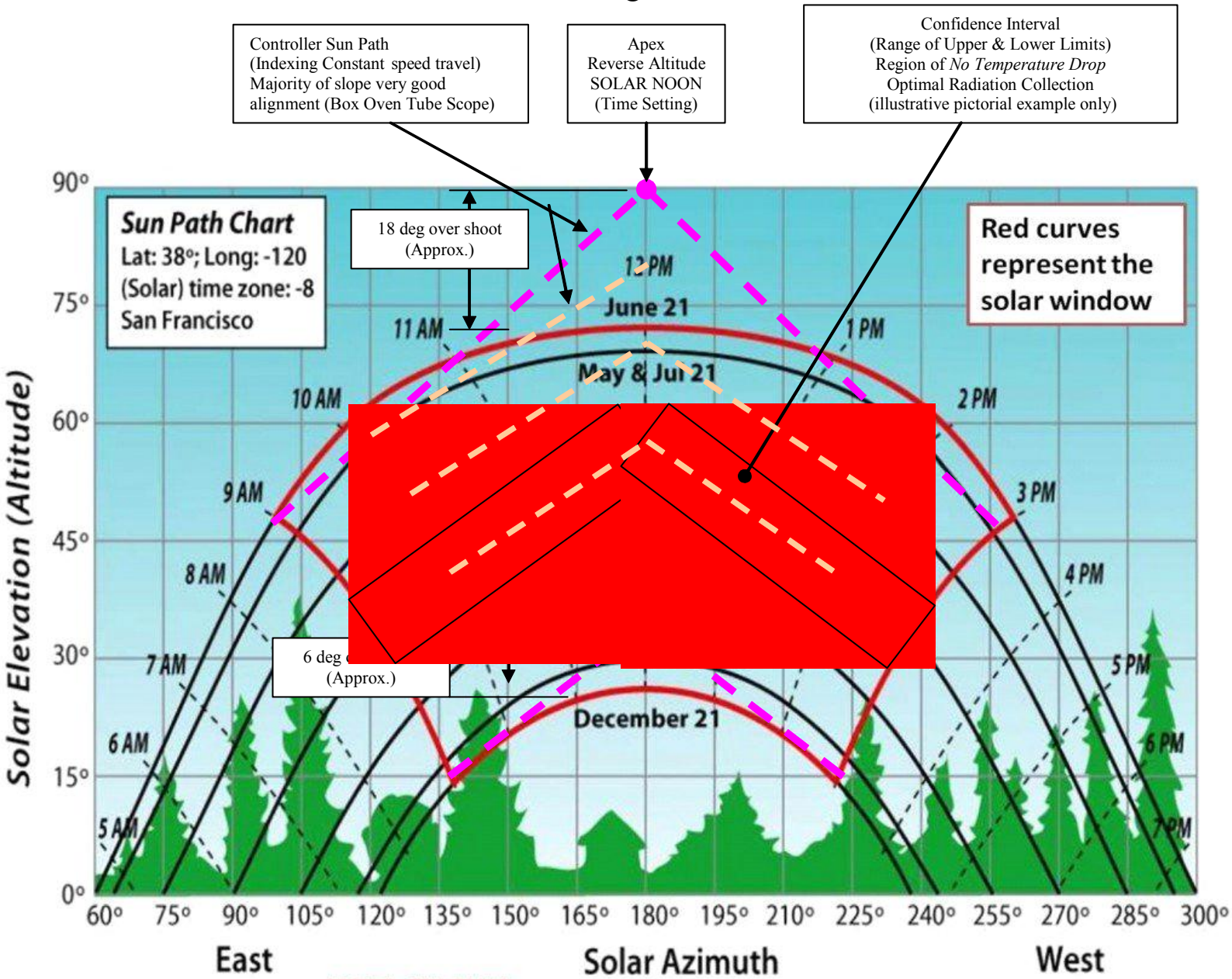
Operator Plugs into Solar Z[®] from Kitchen (CAT 5 568A Cable, see arrow)





“Approximation Tracking”

Electronic Controller
Sun Path Tracking Performance



100(1 - a)% Confidence Interval, (a (alpha) is the Significance Level (Confidence Level) of the test)

Confidence Interval for μ is: $\bar{X} \pm z s_{\bar{X}}$ (Margin of error for estimate of $\mu = z s_{\bar{X}}$)

where: $s_{\bar{X}} = s/\sqrt{n}$

and: $z = (x - \mu)/s$

μ = Standard Normal Distribution Mean

Test Sampling data: Sample Test Measurement: Solar Azimuth: $f(td_i) = \pm (\text{angle}_1 - \text{angle}_2)$ & Solar Altitude: $f(td_i) = \pm (\text{angle}_1 - \text{angle}_2)$

$Td_i = f(x) = \pm(x_1 - x_2)$

X_1 = angle of box solar oven aligned perpendicular to sun rays

X_2 = angle of misalignment of observed initial temperature drop

Td_i = temperature drop, initial

Alpha Lab Prototype → to → *New Beta Controller Unit*



*Solar Z[®] model 1018-LSST Unit Adjusting, Data Collection, and Performance Testing of Installed Beta Unit
Continues at TM Hoffmann Enterprises (Santa Cruz, CA)*

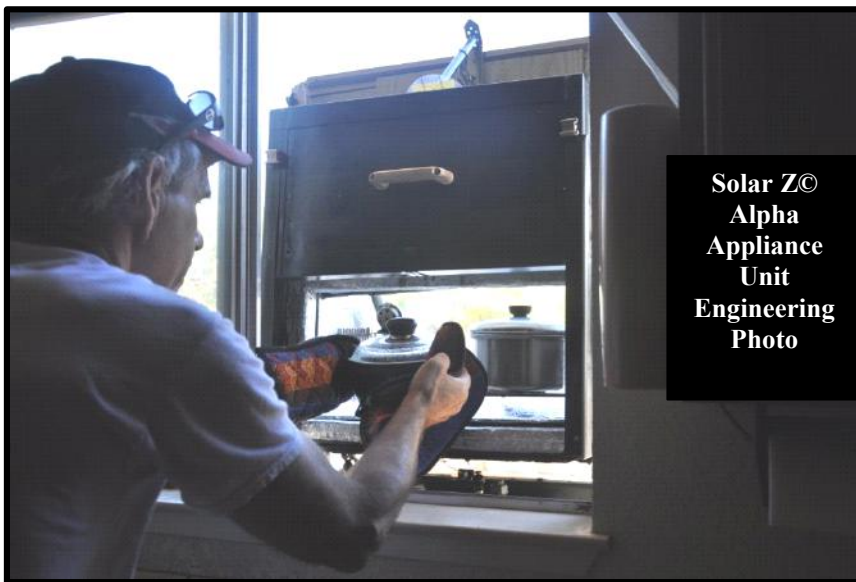


192 Test Cooks with Beta Unit (Model 1018) to Date 9/6/2022 (Santa Cruz, CA)





“Bringing the power of the sun into your kitchen”



Solar Z[©]
Alpha
Appliance
Unit
Engineering
Photo



Bake to Nature!

Watch for more developments in the future
The ultimate in solar cooking

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Thomas M. Hoffmann

Thomas M. Hoffmann
Engineer / Inventor

