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DOE/NASA CONTRACTOR
REPORT

DOE/NASA CR-161559

SOLAR HOT WATER SYSTEM INSTALLED AT DAY'S LODGE,
ATLANTA, GEORGIA

Prepared from documents furnished by

Day's Inn of America, Inc.
2751 Buford Highway, N. E.
Atlanta, Georgia 30324

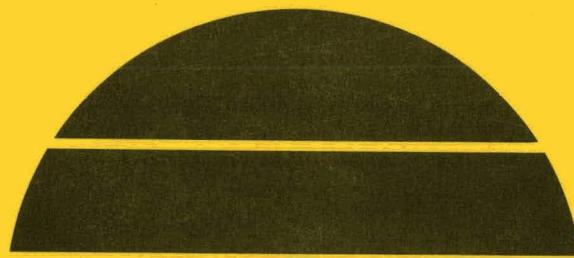
MASTER

Under Contract DOE EG-77-G-01-1632

Monitored by

National Aeronautics and Space Administration
George C. Marshall Space Flight Center, Alabama 35812

For the U. S. Department of Energy



U. S. Department of Energy



Solar Energy

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16. ABSTRACT <p>This final report describes the solar energy hot water system installed in the Days Inns of America, Inc., Day's Lodge I-85 and Shallowford Road, N. E. Atlanta, Georgia. This system is one of eleven systems planned under this grant and was designed by Whelchel Solar Enterprises, Inc., to provide for 81 percent of the total hot water demand. There are two separate systems, each serving one building of the lodge (total of 65 suites). The entire system contains only potable city water. The 1024 square feet of Grumman Sunstream Model 332 liquid flat plate collectors and the outside piping drains whenever the collector plates approach freezing or when power is interrupted. Solar heated water from the two above ground cement lined steel tanks (1000 gallon tank) is drawn into the electric Domestic Hot Water (DHW) tanks as hot water is drawn. Electric resistance units in the DHW tanks top off the solar heated water, if needed, to reach thermostat setting. Operation of this system was begun in August, 1979. The solar components were partly funded (\$18,042 of \$36,084 cost) by the Department of Energy. Under Grant EG-77-G-01-1632 under the technical management of NASA/George C. Marshall Space Flight Center, Alabama.</p>			
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SOLAR DOMESTIC WATER PRE-HEATING SYSTEM
FOR DAYS LODGE AT I-85 AND SHALLOWFORD RD. IN ATLANTA

DESCRIPTION

The Solar System is a water pre-heating system employing direct circulation through liquid flat-plate collectors, water storage, and automatic drain-down for protection from freezing. It can be expected to provide about 81% of the energy required annually to bring incoming water up from 61°F to 140°F based on an estimated usage of 1370 gallons per day.

The conversion of radiant Solar Energy to useful heat energy is accomplished with 32 Grumman Model 332 Solar Collectors, which provide 1024 square feet of Total Collector surface. Water is circulated from the storage tank to the collectors and back to the tank automatically and continuously whenever a net energy gain can be realized.

As hot water is drawn from the existing electric water heaters it is replaced with pre-heated water from the solar storage tank, thus eliminating or greatly reducing the electricity consumption normally required. If the temperature of the stored solar heated water does not satisfy the thermostat setting of the water heaters, the element will come on briefly to "top off" the incoming water. During extended sun-less periods when the pre-heated water is exhausted, the heaters will assume the full load to insure an uninterrupted supply of hot water. Substantial savings can be attained by operating the water heaters in this type of back-up mode.

The collector plates are copper, black chrome coated, backed with one inch of isocyanurate foam insulation (R=7.7) and encased in a durable aluminum frame. The glazing is low iron glass.

The cement-lined steel storage tank is manufactured according to A.S.M.E. specifications and bears the A.S.M.E. stamp. Automatic control is provided by a U.L. approved differential thermostat which activates the pump when plate temperature is 20°F higher than storage temperature and de-activates it when storage is within 30°F of plate temperature. When the plate temperature approaches freezing, the controller causes solenoid valves to isolate the collectors and exterior lines from the rest of the system to allow them to drain. In event of electrical interruption the solenoid valves fail safe to allow drain-down.

The storage tank will be placed in close proximity to the water heaters. The existing building was modified to accept the storage tank.

REQUIREMENTS ANALYSIS

Water:

The hot water requirements were calculated based upon each unit being occupied 85% of the time using approximately 24 gallons of hot water daily/unit.

North Building:

$$32 \times .85 \text{ occupancy} \times 23.7 \text{ gal/per unit} = 645 \text{ gallons}$$

South Building:

$$36 \times .85 \text{ occupancy} \times 23.7 \text{ gal/per unit} = \frac{725}{\text{Total}} \text{ gallons}$$

A computer analysis is enclosed showing the optimum Solar design to provide 81% of hot water usage based on 23.7 gal/per unit @ 85% occupancy.

DIRECT FLOW CONSIDERATIONS

The local DeKalb County Water Department provided the following water analysis.

Calcium	5.3 PPM	(Calcium hardness 17 PPM)
Sodium	2.3 PPM	
Potassium	1.3 PPM	
Magnesium	.6 PPM	

Total hardness of the water was 22 PPM with an average PH of 8.9.

Due to this extremely soft water condition there is no reason to be concerned with scaling effect in the solar hot water direct circulation system.

1 TEC INPUT

332

1.0,40.,7,24,29.,
1.,0.,0.,0.,0.,
61.,140.,80.,34.,9.,34.,11.,70.,
30.0,0,0,0,35.,70.,-1000.,
.1,0.,685.,0.,0.,340.,0.,0.,345.,1..

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.TEC

INPUT COLLECTOR TYPE LOCATION

.1002X142 ATL

DMSLI07401 EXECUTION BEGINS...

DMSLI07401 EXECUTION BEGINS...

10

No HTY

PROJECT NAME
LOCATION

DOMESTIC HOT WATER
DEALER/CLIENT

SYSTEM REQUIREMENT SUMMARY

HOT WATER SUPPLY TEMP 140.0 DEG F GROUND WATER TEMP 61.0
HOT WATER USAGE MON TUE WED THU FRI SAT SUM TOTAL
(GALLONS) 1370.1370.1370.1370.1370.1370.1370. 9590.
ANNUAL ENERGY REQUIREMENT 329.1 MMBTU/YR
(NOT INCLUDING STANDBY OR COMBUSTION LOSSES. THESE LOSSES MAY BE
AS MUCH AS 50% OR MORE OF THE HOT WATER HEATING REQUIREMENT.
EFFORTS TO REDUCE THESE LOSSES SHOULD BE TAKEN BY SUCH METHODS
AS INSULATING THE AUXILIARY TANK (IF SAFE), PLUMBING LINES
AND REDUCING TEMPERATURE OF SAID TANK.) FUEL COST \$

SOLAR SYSTEM
TILT=34.00 DEG

COLLECTOR MODEL 332
AZIMUTH= 0.0 DEG FROM SOUTH

NUMBER OF PANELS	AREA OF PANELS	SIZE (GAL)	ESTIMATED		
			TANK SOLAR ENERGY MMBTU/YR	FIRST YEAR COLLECTED \$ SAVINGS	FIRST YEAR SUPPLEMENTARY ENERGY COST \$
30	870.0 <i>Appt 1000.</i>	250.4	75.90	0.0	0.0
<i>Add 2</i> 32	<i>1009.0 Total</i>	0.	267.0	21.90	0.0
0	0.0	0.	0.0	0.0	0.0
0	0.0	0.	0.0	0.0	0.0
0	0.0	0.	0.0	0.0	0.0

PROJECTED TEN YEAR SAVINGS
NUMBER OF
PANELS

INFLATION RATE

30	6%	0.	0.	0.
0	0.	0.	0.	0.
0	0.	0.	0.	0.
0	0.	0.	0.	0.
0	0.	0.	0.	0.

PENALTIES

- AVERAGE WEATHER CONDITIONS FOR YOUR REGION WERE USED IN ANALYSIS
- ANALYSIS BASED ON PIPE HEAT LOSS OF 0.100 ETU/FT-FT-DEG
- STORAGE TANK INSULATION VALUE IS R-11.
- SAVINGS BASED ON PRESENT FUEL PRICE OF + 0.6 MMBTU

Whelchel Solar Enterprises, Inc.



SALES, INSTALLATIONS, ENGINEERING & CONSULTANTS

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TELEPHONE 404-458-2311

SOUTH GEORGIA BRANCH
CEDAR POINT, CORDELE, GA. 31015
TELEPHONE 912-273-6208

SHALLOWFORD ROAD SITE

DAY'S LODGE

ATLANTA, GEORGIA

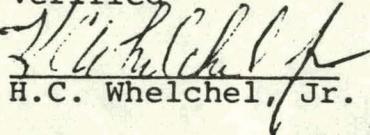
Test Results of Solar Hot Water System

Date: Friday 15 November 1979

Weather: Clear

Ambient °F	Time	Collector °F	Storage Tank °F
59°	0900	84°	58°
64°	1000	104°	64°
64°	1100	121°	77°
64°	1200	136°	93°
64°	1300	144°	108°
65°	1400	147°	123°
65°	1500	144°	129°
65°	1600	140°	132°

Verified


H.C. Whelchel, Jr.

PLASTICOOL
(SOLAR REFLECTIVE COATING)

GRUMMAN ENERGY SYSTEMS
(SUNSTREAM)

HYDROHEAT PRODUCTS
(WATER CIRCULATING GRATE)

SOLAR HOT WATER SYSTEM

OPERATING AND MAINTENANCE

Instructions

for

**DAYS LODGE, Shallowford, Road
Atlanta, Georgia**

DAY's LODGE

2 - 500 Gallon Solar Domestic Water Heating Systems

System Description

The Domestic Water Heating System on each building is completely separate and has no common controls or piping. Each building has 16 Grumman 332 collectors connected to a 500 gallon Finnigan cement lined tank using the open loop solar design principal. The North Building has a CI Model 60 controller while the South Building has a CI Model 100 controller. The CI Model 60 has two sensors on a collector; the sensor on the left is wired to the Aux. 1 position on the controller and is the sensor that activates the freeze drain-down feature of the system when the collector temperature reaches 38°F. The system refills when the temperature reaches 43°F. The sensor on the right is wired to the collector sensor position on the controller and causes the circulator (pump) to activate whenever there is a 20°F differential between the tank sensor and the collector sensor. The circulator is turned off when this differential reaches 5°F. The South Building system operates in the same manner but uses only one sensor on the collector.

Collector drain-down also occurs whenever electrical power to the control is lost. This is known as a fail safe feature.

Electrical power to the controller, circulator and solenoid valves is 120v/60hz. The wires to the sensors are not powered. The fourth circuit breaker from the left in the small sub-panel powers the system on the North Building; one leg (120 volts) in the large circuit breaker (nearest the outside door) powers the South Building controller.

Both North and South Building Systems have sensors on the collectors and in the storage tank. Each system has four thermal read out ports in the piping near the storage tanks; incoming street water; water to the collectors; water from the collectors; and water to the water heaters. Only the South Building has equipment installed to read out these temperatures. The South Building controller has a step button switch that selects six positions for a lighted display read out:

Collector	Collector plate temperature
Storage	Storage tank temperature 6" from tank bottom
Aux. 1	Incoming street water temperature
Aux. 2	Water to collectors temperature
Aux. 3	Water from collectors temperature
Aux. 4	Water to water heaters temperature

During average conditions the Solar tank temperature should read about 120°F at the end of the Solar day.

System Operating Instructions:

Water is admitted to the Solar storage tank by opening the main close off valve (valve #1). The solar preheated water is admitted to the electric domestic water heaters by opening valve #2. Valve #3 is the by-pass valve. Valve #1 and #2 are normally open, valve #3 is normally closed. If the Solar tank is to be isolated for any reason, valve #3 should be opened and valves #1 & 2 must be closed. Valve #4 is in the line from the storage tank to the collectors. Valve #5 is in the line from the collectors. Valves #4 & #5 are normally open. Valve #6 is a by-pass valve around the main solenoid shut off valve and is normally closed.

Valve #7 is a $\frac{1}{2}$ inch valve on a by-pass around the drain down solenoid valve. Valve #7 is normally closed. It can be opened to drain the collectors and their associated lines. The flow path

of the water is from the street source to the storage tank moved by city pressure. The circulator causes the water to flow through the collectors back to the storage tank (this cycle will take place many times during the solar day). The Solar pre-heated water flows from the storage tank to the water heaters at city pressure. All water going to the hot water heaters must pass through the storage tank unless valve #3 is open. The water may not circulate through the collectors if no Solar energy is available. There is a strainer in the line upstream of the main solenoid valves. Its purpose is to protect the solenoid valves from possible debris. There is a flow control valve in the return line from the collectors. This valve has been set and requires no further adjustment. Should it be tampered with open it fully until it can be reset.

In the event of electrical power failure or freezing conditions the collectors and outside piping drain down. This is accomplished by: the $1\frac{1}{2}$ " main solenoid valve closing; the $\frac{1}{2}$ " drain solenoid valve opening; the $1\frac{1}{2}$ " check valve closing; the two vacuum relief valves on the upper collector manifolds opening; and (to a limited degree) the 3 air elimination valves on the upper piping opening. When the collectors reach 43°F (or above) and electrical power is available the collector loop refills by: The main solenoid valve opening; the drain solenoid closing; the vacuum relief valves closing; city water pressure refills the lines and the air elimination valves purge the air and the system is now ready to gather energy whenever the controller activate the circulator. The $1\frac{1}{2}$ " check valve is opened by circulator pressure. The $\frac{1}{2}$ " check valve permits unwanted flow between the two collector lines during operation but allows both lines to drain freely. The collector drain is outside the buildings; drain-down is intended to be obvious.

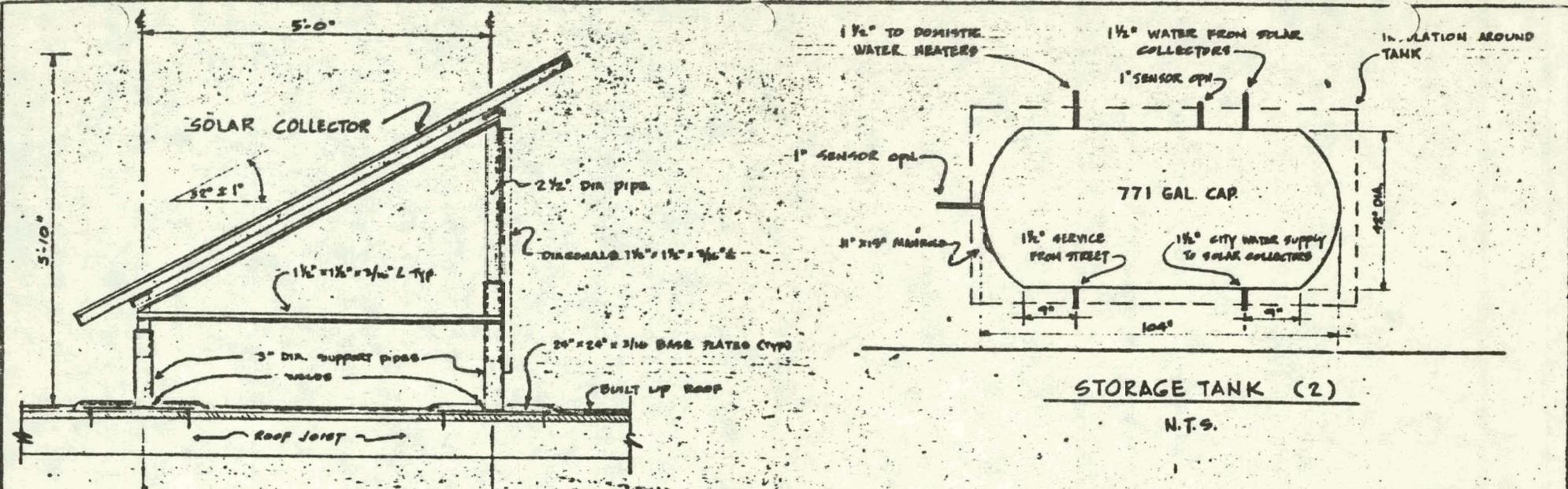
Periodic Maintenance Required:

Annually:

- 1) Manufacturer recommends that the circulator (motor and pump) be oiled with 30 weight motor oil.
- 2) Before freezing conditions are likely to occur; remove electrical power from the system and observe that drain-down occurs. Drain-down takes about 4 minutes.
- 3) Attach a garden hose to the hose bib on the y strainer and back flush the filter for a few minutes.
- 4) Attach a hose to the hose bib on the feed water line to the storage tank and drain the tank for a few minutes. The purpose of 3) and 4) is to remove any accumulated sediment from the strainer and storage tank.

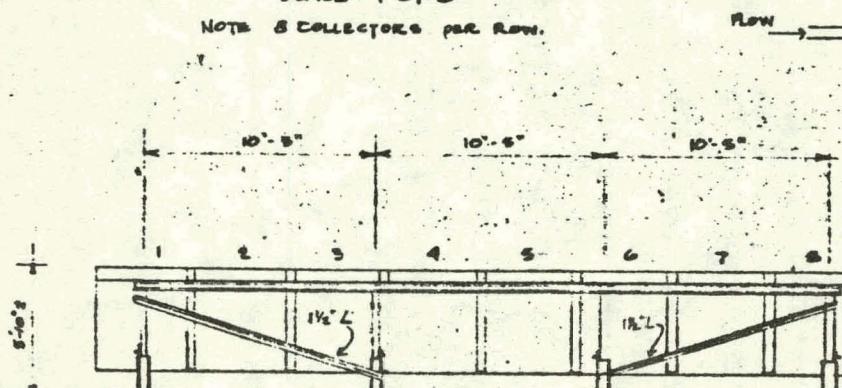
Should you have any questions, please contact Whelchel Solar Enterprises, Inc.

Note: During impending freezing conditions should automatic drain-down ever fail to occur the collectors and associated outside piping subject to freezing must be manually drained by opening valve #7 and closing valves #4 and #5. The collectors should remain drained until the system is restored to proper operating condition.



TYPICAL SOLAR COLLECTOR SUPPORT SECTION

SCALE: 1° = 1'-0"

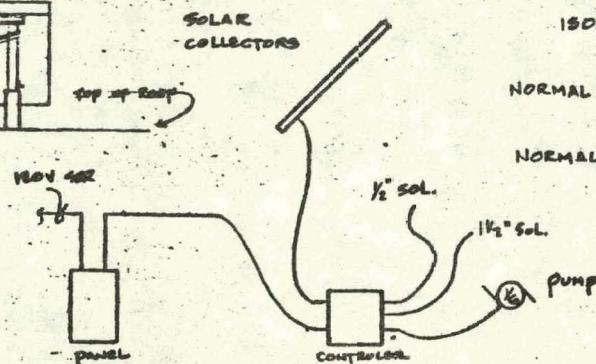


REAR VIEW STEEL SUPPORTS

SCALE : 1^o = 1'-0"

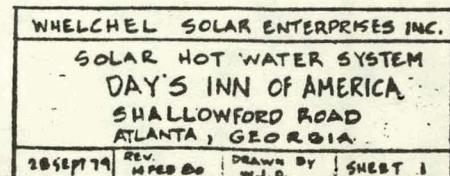
SHUT DOWN
@ 38° FILL UP AT
41°

COLD WEATHER CONDITIONS

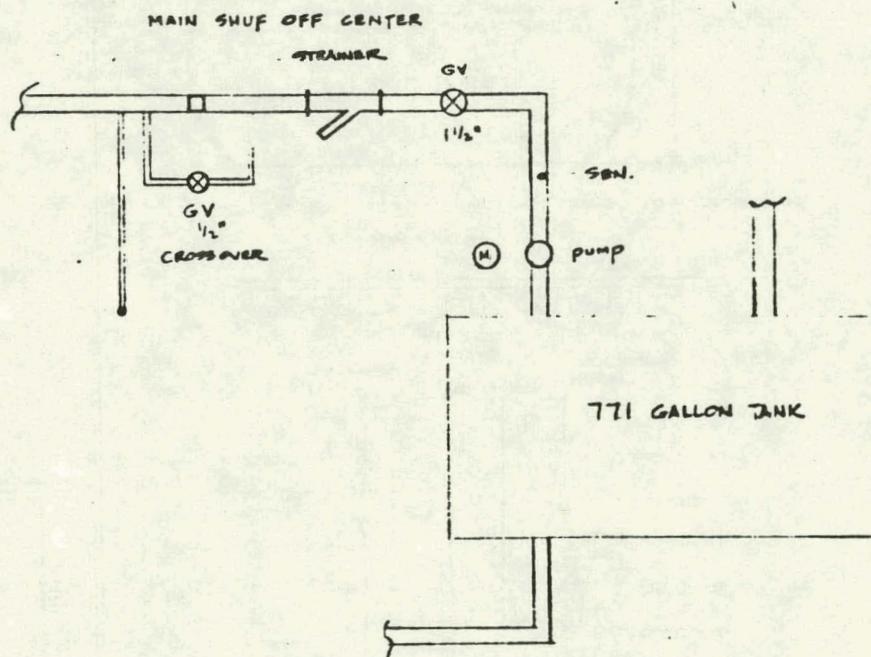
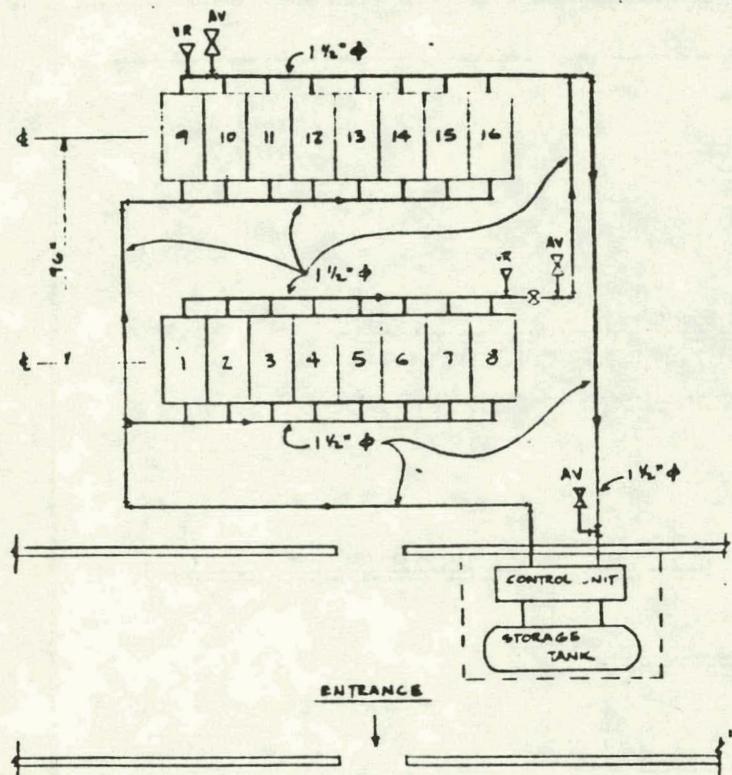


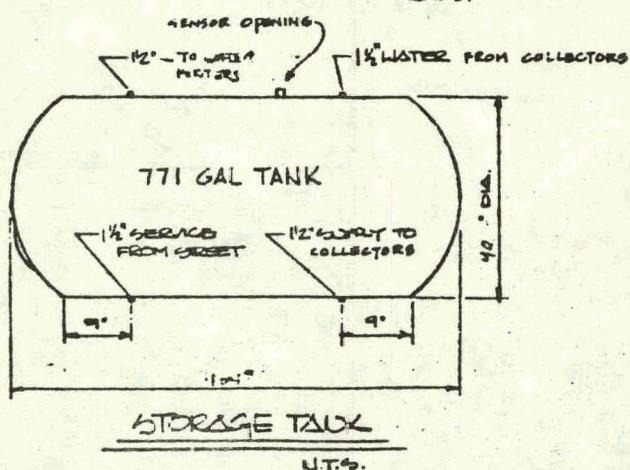
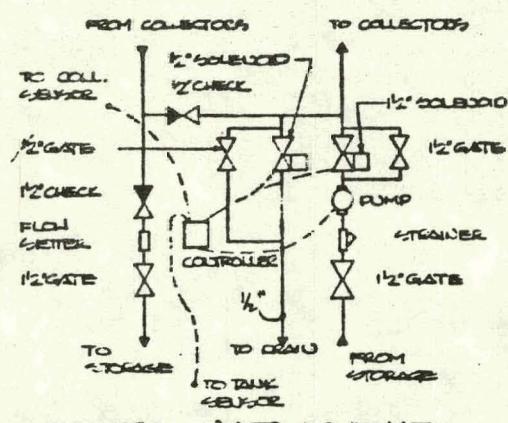
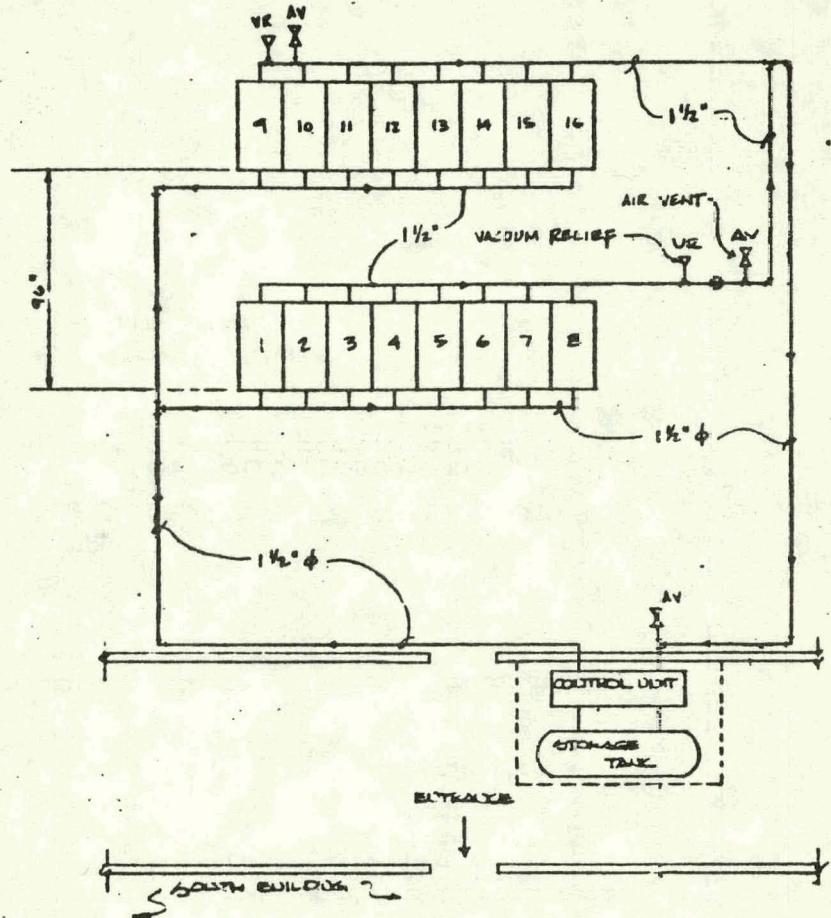
— ELECTRICAL DIAGRAM

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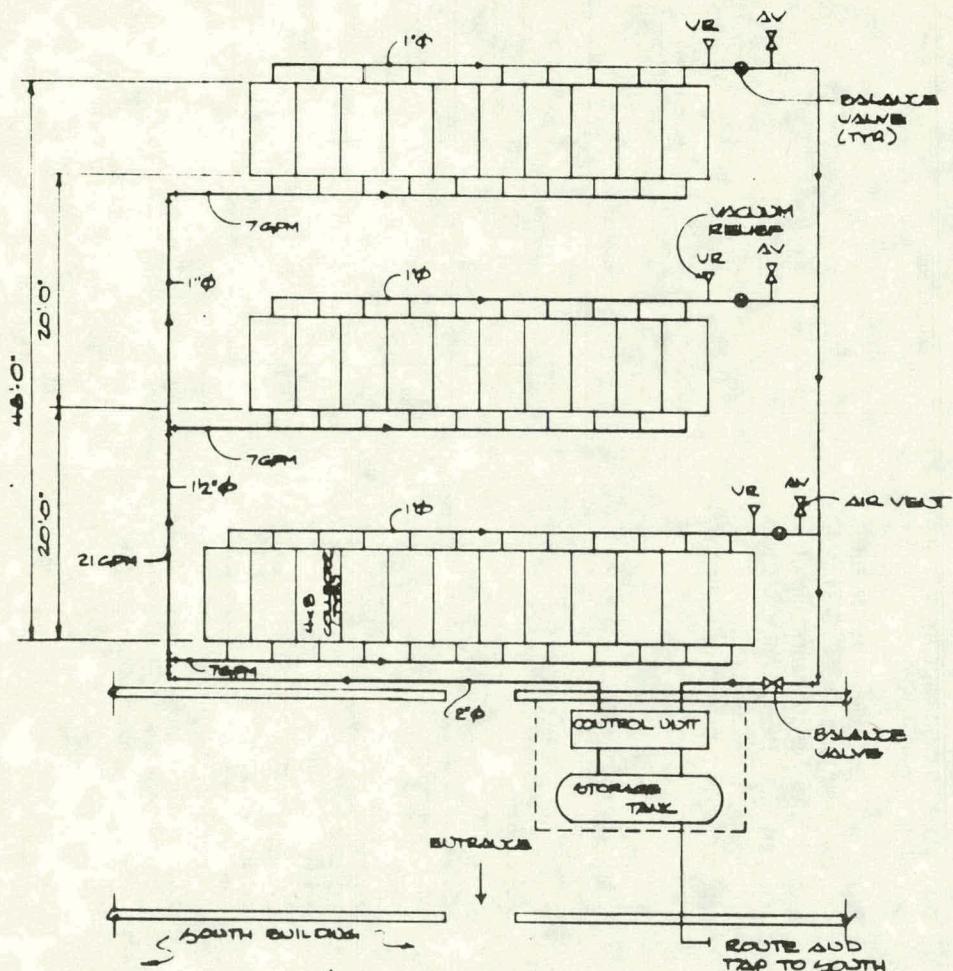
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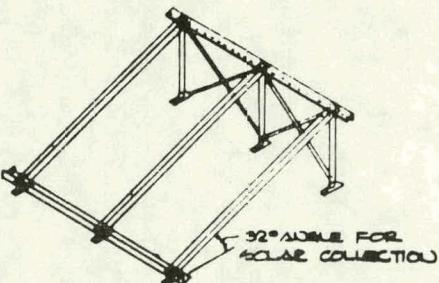
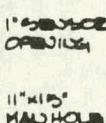
△ PROJECT NO. 8002 SOLAR ESTER PROJECTS, INC.

2000-01-24 CADDY AND AUTOMATION GROUP
PROJ. NO. C. CADDY AND AUTOMATION GROUP

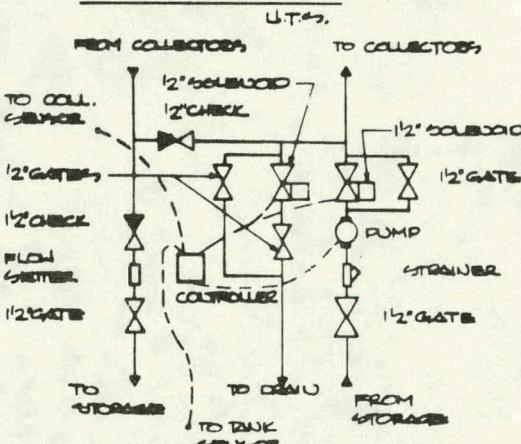


COLLECTOR-ROOF LAYOUT MANIFOLD SCHEMATIC

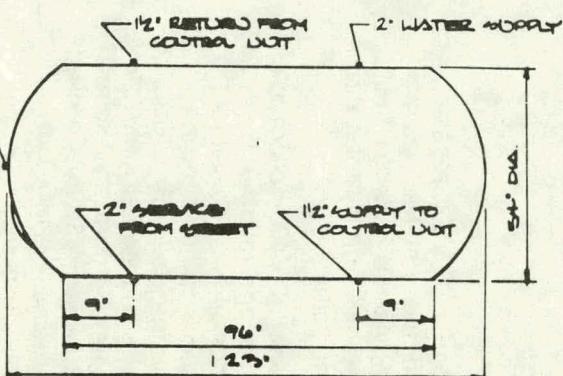
scale 1:10



EXTERNAL RACK MOUNTING SYSTEM



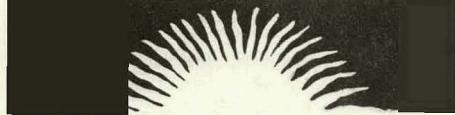
CONTROL UNIT SCHEMATIC



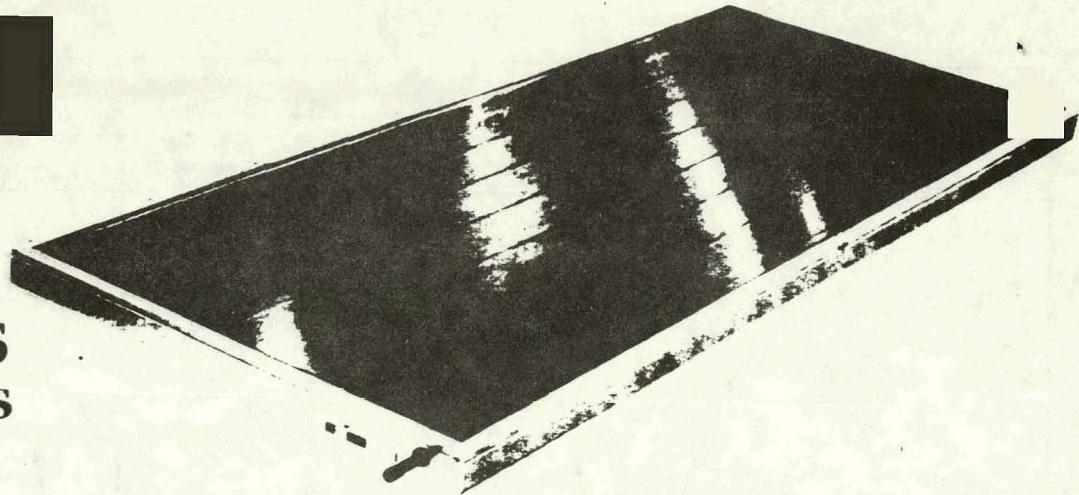
STORAGE TANK

四三

A PROPOSAL FOR SOLAR HOT WATER SYSTEM
BY WHEELCHAIR SOLAR ENTERPRISES, INC.



GRUMMAN SUNSTREAM SOLAR COLLECTORS 300/400 series



Sunstream™ 300/400 series collectors offer the architect, builder, and engineer a collector that provides him with a high ratio of BTUs per dollar.

Sunstream 300/400 collectors are attractive and reliable. They are exceptionally well suited for domestic water heating or hydronic space heating applications . . . in either residential, commercial or industrial structures. Sunstream 300/400 collectors combine the following important features:

FLEXIBILITY

Two standard sizes are available — 3' x 7' and 4' x 8'. However, Sunstream 300/400 collectors can be built to almost any size requirement up to the current available glass sizes of 4' x 10'. Larger collector sizes offer more square footage with fewer plumbing connections, thereby reducing installation costs. Additionally, in certain domestic hot water installations a single large collector may suffice for residential usage. With all 300/400 collectors, various internal header configurations and alternative nipple orientations are available as options.

All 300/400 collectors are light weight for easiest possible installation. Mounting systems are available for mounting parallel or at an angle to the roof surface.

For recommended mounting systems, see the Grumman Sunstream "External Mounting" systems specification sheet.

RELIABILITY/MAINTAINABILITY

The absorber plate as well as all fluid passages are copper construction. All 300/400 series designs permit glazing to be replaced without disconnecting the fluid connections.

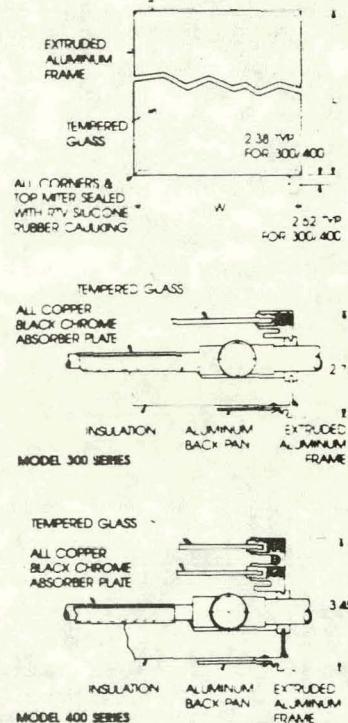
APPEARANCE

300/400 series collectors have a low-profile appearance. Attractive frame colors are optionally available to coordinate with roof or building colors.

Along with excellent relative efficiency, Sunstream 300/400 collectors offer outstanding flexibility. You get high performance along with options that can permit significant customizing or dollar savings.

SINGLE OR DOUBLE GLAZE

DIMENSIONS



Characteristics

Model/Size	L	W	Gross Area, ft ²	Aperature Area, ft ²	Wt., lbs.	
					Model 300	Model 400
321 Standard 332 Sizes	84 96	35 47 ¹ / ₄	20.4 31.8	18.9 30	79 126	119 210
300/400 — 5CL 300/400 — 6CL 300/400 — 7CL 300/400 — 8CL 300/400 — 9CL 300/400 — 10CL	Note 1	26 ¹ / ₂ 30 ³ / ₄ 35 39 ¹ / ₄ 43 ¹ / ₂ 47 ¹ / ₄	Note 2	Note 3		

All Dimensions are in inches

Notes 1 Any length L between 84" and 120"

2 Gross Area, Ag = (LxW)/144, Aperature Area, Aa = (L-1.88) x (W-1.88)/144

3 If your specified collector has gross area, Ag

$$Ag \leq 21 \text{ ft}^2 \text{ then } Wt = \frac{Ag}{20.4} \times$$

Wt of 300-7C7 (single glaze)

or
400-7C7 (double glaze)

$$21 \text{ ft}^2 < Ag \leq 40 \text{ ft}^2 \text{ then } Wt = \frac{Ag}{31.8} \times$$

Wt of 300-10C8 (single glaze)

or
400-10C8 (double glaze)

GRUMMAN SUNSTREAM SOLAR COLLECTORS 300/400 series

EFFICIENCY

Sunstream 300/400 collectors provide you with a high ratio of BTUs per dollar by using high transmissive low-iron glass and a selective absorber plate coating of black chrome. For any given installation fewer 300/400 series collectors may be required to do the solar heating job required.

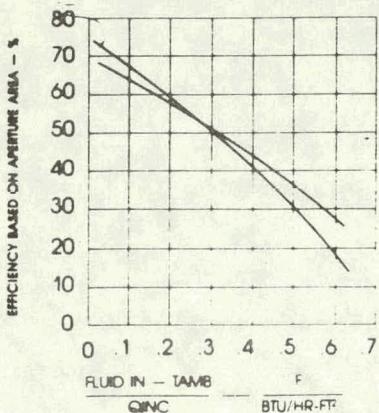
5-YEAR LIMITED WARRANTY

All Sunstream™ solar products carry a five-year limited warranty against defects in materials and workmanship. A copy of this limited warranty is available on request.

GRUMMAN SUNSTREAM

Grumman's worldwide reputation for engineering and manufacturing excellence has also made it a nationwide leader in providing reliable and efficient solar energy installations. For further information and technical assistance, contact us, today.

300/400 SERIES PERFORMANCE



EFFICIENCY — Data is estimated and based on the aperture area and is applicable to all models with pan and insulation. Data cannot be provided for "10" designated models (300/400) since insulation R-value is specified by architect/engineer. Performance estimates for these optional designs will be provided by request.

PHYSICAL CHARACTERISTICS

FRAME AND GLASS RETENTION SYSTEM

ITEM	ALL MODELS
Glass retention frame material	Aluminum extrusion
Finish	Mill Finish (Note 1)
Glass setting and retention	Compression setting
Sealant	One piece, high temperature EPDM rubber gasket with vulcanized corners
Insulation material	Isocyanurate foam
Insulation thickness, in.	1.0 (R = 7.7)
Bottom pan enclosure material	5052-H32 Aluminum

NOTE 1. Optional painted finishes are available on request.

CU-PLANK ABSORBER PLATE

ITEM	Model 321	Model 332
Material	Copper	
Weight, lbs.	21	30
Number of $\frac{1}{4}$ " nominal Cu tube passages	8	11
Header Diameter, in.	$\frac{3}{4}$ NOM	
Inlet/Outlet Diameter, in.	$\frac{1}{2}$ NOM, $\frac{5}{8}$ OD	
Heat transfer fluid	Application dependent	
Recommended flow rate, gpm per collector (Note 1)	0.4 to 0.6	0.6 to 1.0
Operating pressure	\sim 125 psig (proof tested to 200 psig)	
Coating	Black chrome	
α/ϵ	0.96/0.11	

NOTE 1. For water or glycol systems. For other fluids consult manufacturer.

GLAZING CHARACTERISTICS

ITEM	Model 321	Model 332
Type (Note 1)	SOLATEX™	SOLATEX™
Thickness, in.	1/8	3/16
Transmissivity, %	90	89
Design wind/snow capacity, psf (Note 2)	.75	.90

NOTES:

1. Optional glazing supplied on request.
2. Factor of Safety = 2.5; collector mounted flat.

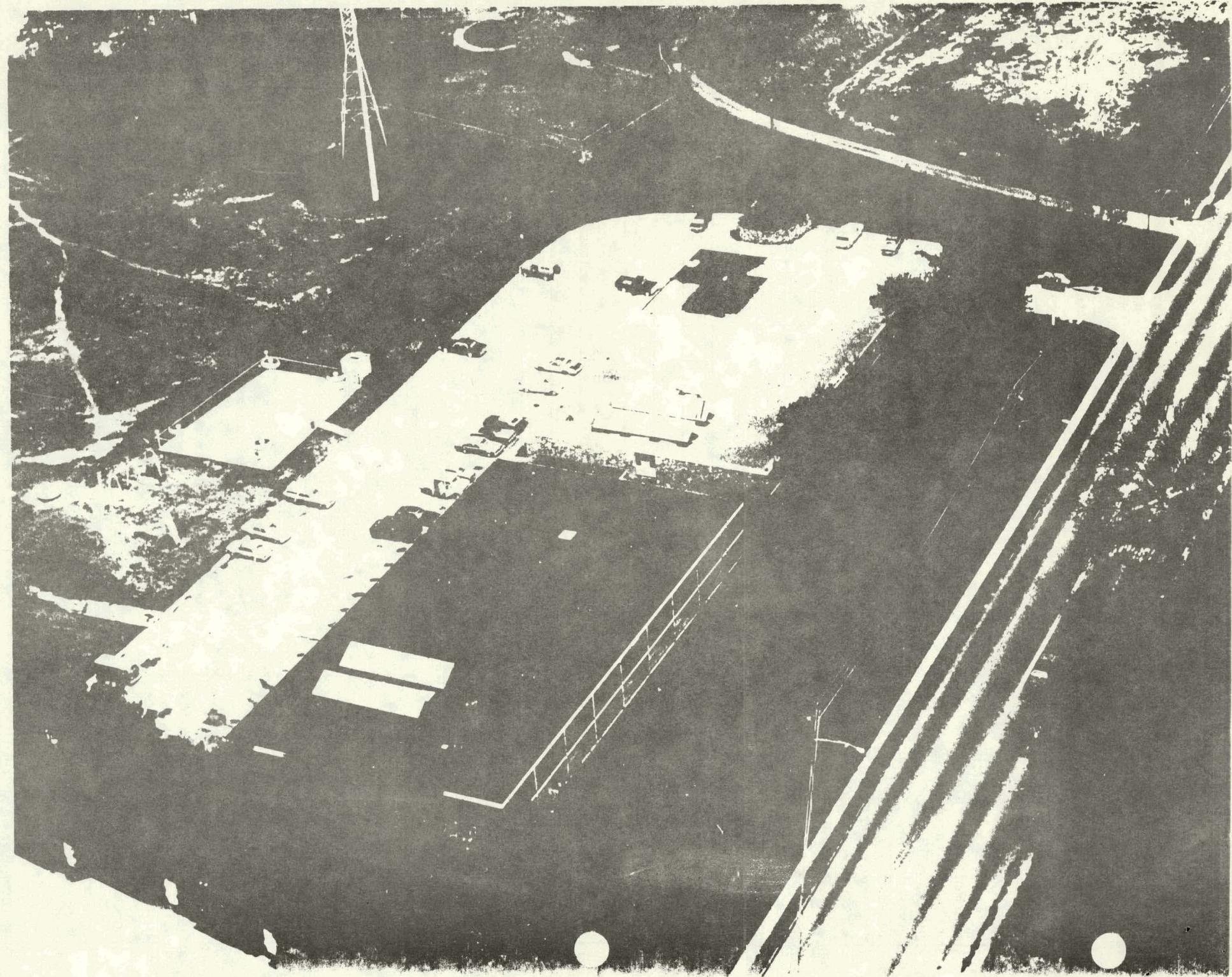
All Model 300 collectors are single glazed.

All Model 400 collectors are double glazed.

Prices and specifications subject to change without notice

FOR FURTHER INFORMATION CONTACT

GRUMMAN ENGINEERING, INC.
4175 VETERANS MEMORIAL HIGHWAY
RONKONKOMA, NEW YORK 11779



SUNDEALER

GRUMMAN HOT WATER SYSTEM SERVES ATLANTA MOTEL

The rising sun on the Days Inn sign in Atlanta Ga., appears to be the perfect symbol for the new solar installation by Whelchel Solar Enterprises.

Thirty-two Grumman Sunstream™ Model 332 collectors are now arrayed on two buildings (16 collectors supply heat to 500 gallon storage tanks on each building). The facility is the Days Lodge at the Shallowford Exit of Interstate 85 in Atlanta. Days Lodge is owned by Day Inns of America, Inc., a nationwide motel chain.

Solar energy is expected to supply up to 81% of the hot water needs for 68 one-room apartments and the laundry.

Hot water needs represent from 15% to 30% of the motel's energy bill. Each unit uses approximately 25 gallons per day.

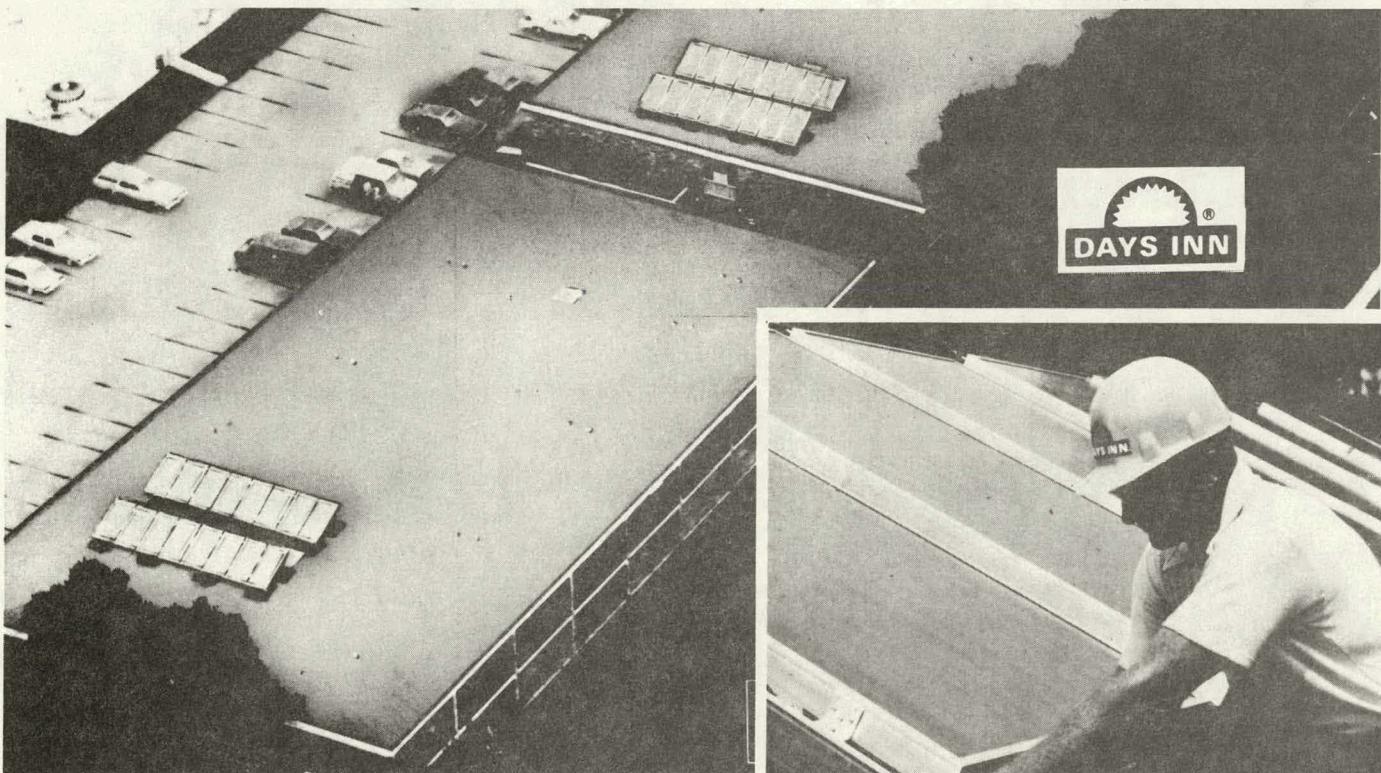
"Because of the pristine quality of the water in this area, we were able to use a direct system with drain-down for freeze protection." Chick Whelchel, President of Whelchel Solar, explained.

The motel contract was the result of many months of effort by Whelchel Solar. It is GESI's first major use of the Model 332 collector. Engineering design was a cooperative effort between Whelchel and Grumman engineers.

"The engineering data helped sell the job," Mr. Whelchel said.

The Shallowford Days Lodge is part of a major program of Days Inns, Inc., to install solar energy systems on thirty motels throughout the south. Motels selected for solar installations are those with the highest energy costs.

Dedication ceremonies for the Atlanta installation featured remarks by Omi Walden, Assistant Secretary for Conservation and Solar for the U.S. Department of Energy. Ms. Walden burned the ribbon with solar energy focused through a Fresnel lens. The solar installation was funded by a 50/50 matching grant from DOE.



Above, aerial view of the Shallowford Days Lodge.
Right, Days Inn employee examines motel installation.



DEALERSHIPS ARE BRANCHING OUT



Supervisor Kenneth Butterfield, (left) of Huntington, burns the ribbon with a magnifying lens at the opening of Sunglow. Bill Lavery, sales manager, (center) and Harvey Kolin, President of Sunglow, (right) hold the ribbon.

Increased sales, a desire to reach a broader geographic area and the need for display space have led to several dealerships opening branch offices.

In the past, solar was a small part of many established businesses which dealt mostly with fuels, plumbing, heating, electrical contracting and construction. Today many dealerships have established a separate branch to handle solar sales. Some dealers, like Meek Construction (featured on page 3), are 100% solar now.

Late in August, Reville Construction, Inc., in Auburn, Calif., opened a

retail outlet store specializing in spas, hot tubs, pools and accessories, all with Grumman Sunstream™ solar heating.

"We were surprised how well our first month went," Rick Owen, store manager with Reville, reported. The store sold five spas, two hot tubs and four domestic hot water systems, all with Model 627 collectors.

"People here like the arched acrylic look," Mr. Owen said.

He went on to explain the difference between a spa and a hot tub. A spa is fiberglass and can be any shape. A hot tub is a redwood tub.

DO IT YOURSELFERS CAN SAVE, IF THEY ARE CAREFUL

that every detail is important."

Nearly 25% of Solar Source's business is across-the-counter sales.

"The big trick in selling this way is assuring the purchasers that we will not leave them high and dry. We promise that we will charge the system and check everything out. And they are pleased to get the warranty along with our approval," Mr. Fornataro said.

Solar Source figures that homeowners can save nearly \$700 by doing their own work.

"Explain this savings and the solar tax credit to a handy man, and it's easy to make a sale," Mr. Fornataro said.

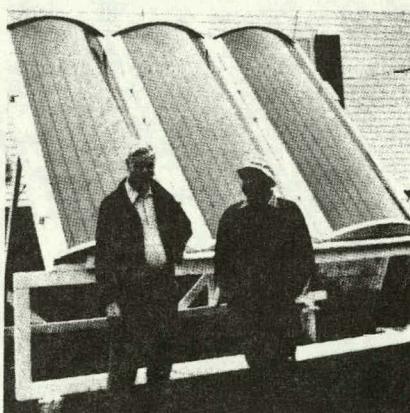
"Interest in these luxury items is spreading. And you don't feel so guilty enjoying all that hot water if you know it's heated by solar energy," Mr. Owen said. Reville has ordered a number of gunite pools which it will be heating with solar.

WEBA Supply of Santa Fe, N.M., opened a new headquarters and warehouse with a ribbon burning at high noon on October 3rd, a reception on October 5th, and a grand opening activities week.

Holt Priddy, chairman of WEBA said the solar business has been "really good" and was the company's main reason for expanding. The new building at 1570 Pacheco Street has nearly 9,000 square feet with display space for new Grumman Sunstream™ products as well as other components of the business, such as pool maintenance and irrigation systems.

In addition to the new headquarters, WEBA has opened branch offices in Roswell and Albuquerque.

Two dealers on Long Island's south shore have opened branches on the north shore. Kolin Plumbing of West Babylon has a store called "Sunglow" in a shopping center in Huntington. Barrett Heating and Air Conditioning of Bay Shore now has a store in Port Jefferson Station. Both dealers report convenience and selling opportunities in a new market area as reasons for expanding.



Many dealers are experiencing an increase in sales of self-installs. These do-it-yourselfers, customers of Energy Conservation and Solar Center, Division of Kalwall Corp. in Manchester, N.H. were featured in the bulletin of the Northeast Solar Energy Center.

Dealer Focus

A Mild Manered Superman

This is the mouth-watering story of a dealer located in a county where, since October first, all new residential plans are required to include a solar water heater.

"Business is exploding here," said Greg Meek, President of Meek Construction in Escondido, Calif. He explained that in California builders can take a 55% state tax credit and the federal tax credit of 30% can be taken by homeowners. "This means that 85% of a system's cost is subsidized by the state and federal governments. With these financial incentives and the San Diego County mandate, I expect to be putting in 2,000 systems a year within two years," Mr. Meek said.

Mr. Meek has been an environmentalist for 12 years, graduating from San Diego State with a degree qualifying him to be a geography teacher. But he liked construction and soon started a general contracting and plumbing business.

"I was doing a plumbing job for a customer who wanted solar and specified Grumman, so I looked into it," Mr. Meek recalled. "The more I found out about it, the better I liked it. Now I'm full time, all solar, all Grumman," he said.

Because he came on as a dealer when the new collectors came on line,

most of Mr. Meek's installations use the 300 series collectors and the module. He finds the five-year parts and labor warranty a particularly good selling point.

A good example of how much Mr. Meek believes in the system and how well he can sell the system is his story of a customer who had a working system in place manufactured by a company no longer in business.

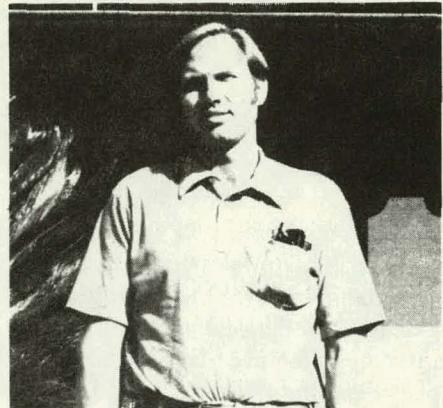
"So the customer had no warranty protection, and also the collectors were not attractive," Mr. Meek explained. He recommended that the whole system be replaced with Grumman, and the customer accepted his advice.

Mr. Meek finds that lending institutions in his area are favorable to Grumman. He reports that they take a careful look at companies before giving a loan.

"Grumman's solid engineering background and the five-year warranty are something they can believe in," Mr. Meek said.

He finds builders, too, favoring Grumman. In making contacts, Mr. Meek has been assisted by John Hill, solar sales representative at the San Diego Grumman Sunstream™ Center. There builder prospects can see all the products on display.

"When we explain the tax credits, the efficiency of the unit and the



GREG MEEK

Meek Construction Company
1520 Industrial Avenue #E
Escondido, California 92025

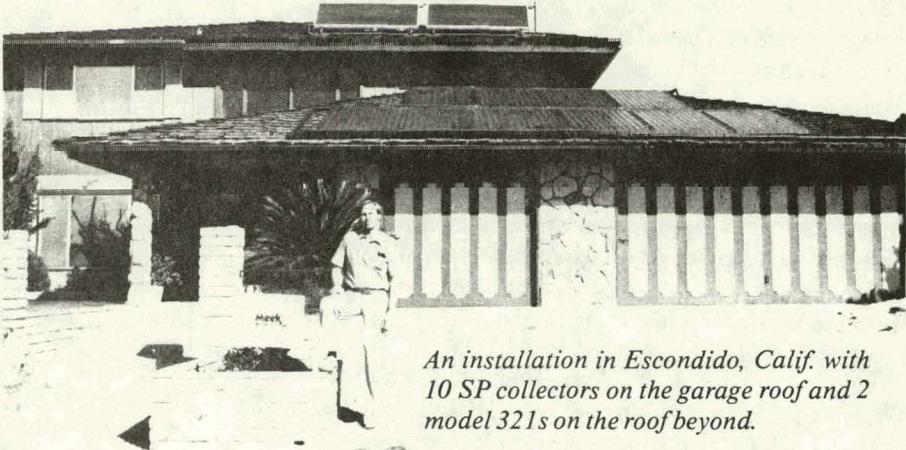
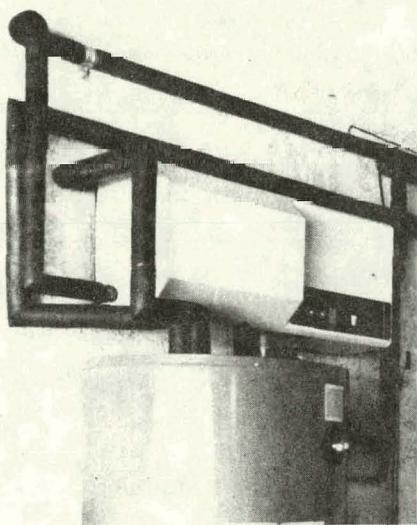
warranty, they like what they hear," Mr. Meek said.

Meek Construction just gave a bid on installations for 142 new homes.

Meek has installed two pool heating systems with ground-mounted collectors on redwood racks. One pool featured ten 60F collectors. Meek just signed a contract to install a 44-panel system for the Mira Mesa Homeowners Association Pool and another contract for a 50-panel condominium pool system is pending. These will be the largest Grumman Sunstream™ pool heating systems to date.

Mr. Meek is extremely enthusiastic about solar and realizes that circumstances have placed him in an outstanding marketing situation that will be difficult for other dealers to match.

"Just tell other dealers that I can leap tall buildings at a single bound," he said modestly.



An installation in Escondido, Calif. with 10 SP collectors on the garage roof and 2 model 321s on the roof beyond.

At left, a module installation.

DEALERS BENEFIT FROM PRESS AND BROADCAST MEDIA INTERVIEWS

Across the country, newspapers, radio and T.V. interviewers are finding that Grumman Sunstream dealers are local experts on the timely subject of energy.

The day after Gary Shoemaker of Barrett Heating and Air Conditioning in Bay Shore, N.Y., was interviewed in a Long Island newspaper he received a call from Channel 11, WPIX, to appear on an energy news segment. Asked to supply a satisfied customer whom the station might feature Mr. Shoemaker had an appropriate suggestion: Jimmy Carter from Babylon N.Y.!

Jim Griffin of Alternate Energy Systems in Rochester, Minn., appeared on ABC-TV, WXYZ, Detroit, on July 27, in a discussion of solar and the public utilities. The broadcast was filmed from the roof of a satisfied customer's house. A closeup of the customer's electric bill showed a 22% saving since the solar system was installed.

"I told people on TV, despite what the utility companies say, solar is a good bet against electricity for hot water heating," Mr. Griffin said.

John Brown of South Jersey Solar in Ocean City, N.J., was interviewed by the press about the HUD grant program and difficulties dealing with the state energy department.

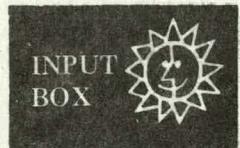
Mr. Brown was pictured with an "antique" solar bath house in his backyard. The painted black tank on the roof contrasts with the Grumman Sunstream™ system on his adjacent house.

Chick Whelchel and his wife Fay, co-owners of Whelchel Solar Enterprises in Georgia, were featured on a half-hour radio program in Atlanta following ceremonies at the Days Lodge solar installation dedication. Ms. Whelchel pointed out that Georgia imports 95% of its energy.

Several other radio broadcasts in other parts of the state are planned.

"Radio interviews are a good way to get your message across to the public. And they don't cost you a cent," Ms. Whelchel said.

Tom Stockton of Solar-Rise, Inc., in Hyde Park, N.Y., uses a strip chart recorder as a trouble-shooting device.



"The strip chart needle records on paper for the customer the hourly changing temperatures at the collectors and storage tank," Mr. Stockton explained. He leaves the strip chart in place for three days.

He finds the strip chart an excellent tool to allay the fears of customers who find a low-temperature reading on the tank at the end of the day, forgetting that there has been a large withdrawal of hot water.

"The line on the strip chart is graphic proof of the system's performance," he said. Solar-Rise uses the strip chart in conjunction with an electronic thermometer.

"Customers are impressed with the equipment. It shows we know what we're doing," Mr. Stockton said.

DEALERS BECOME SOLAR EDUCATORS

Several Grumman Sunstream dealers are using their showrooms as classrooms.

In Santa Monica Calif., Frauman Enterprises has started classes in "How to Buy Solar." The firm has received considerable interest in the program from architects, contractors, and homeowners.

"We felt there was a real need for people to be able to understand various systems, compare warranties, understand what an installer does," said Ruth Frauman, partner in the firm with her son Mark.

Mark Frauman has had experience speaking at colleges and, as a graduate engineer, is able to answer technical questions. Ms. Frauman's background in public relations work has been helpful in organizing and publicizing the course.

Meanwhile, in Detroit, Bror Hanson of Solergy has teamed with Dick Montgomery, a solar advocate who wrote "The Solar Decision Book" (Dow-Corning, 1978). Mr. Hanson and Mr. Montgomery cooperated in efforts to have the Michigan 25% solar tax credit passed.

Now the two are conducting seminars to educate the public in various aspects of solar. Tuition is \$75 a day.

"The Solar Business Decision" is a two-day sales and marketing seminar. "The Solar Technical Decision" offers information on equipment and installation.

In Easton, Pa., Mac Masters, Sales Manager for Metz Mechanical, had an overflow crowd for a Solar Energy Clinic which was advertised in the newspaper and on FM radio. The display room at Metz seats 50 people. More clinics are planned using a film on energy management and the Grumman slide presentation.

SOLAR ENERGY CURRICULUM AVAILABLE

A solar energy curriculum is now available from the Government Printing Office (Wash. D.C. 20402). School districts may order the books, designed for grades 7-12, by sending \$18.60. (Order #061-000-002, 28 thru 35).

Rod Noonan, Vice President, Marketing, suggests that dealers inform their public schools about the curriculum.

"Educational programs are excellent for providing objective solar information to the public. Teachers will be pleased to know that these valuable resource materials are available," Mr. Noonan said.

GRUMMAN

ENERGY SYSTEMS DIVISION

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