SOLAREX

UNIPANELS ™, ARRAYS AND SOLAR ELECTRIC GENERATORS

GENERAL INFORMATION

UNIPANELS

Solarex has developed the modular concept in solar electric power generation with the UNIPANEL ™ as the basic building block. The Solarex UNIPANEL (solar electric module) is generally fabricated from epoxy fiberglass materials and contains a specific number of interconnected CHEVRON ™ silicon solar cells [1] to deliver a particular peak Watt output. The solar cells are encapsulated in and secured to the panel surface by means of a highly transparent silicone rubber to provide a very durable, weatherable package that is substantially maintenance-free. There are no exposed metal components of the UNIPANEL and the external connecting wires are typically Teflon* coated. If specified, for certain applications where the UNIPANEL surface exposed to the sun must have high resistance to impact, Solarex utilizes tough, transparent cover materials such as Lexan.†

* Reg. TM DuPont

† Reg. TM General Electric

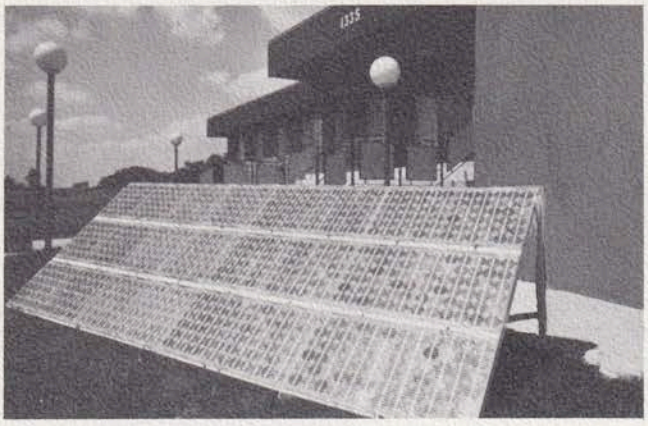

Fig. 1 200 Watt Array of Type 480 Unipanels

SOLAR ARRAYS

A Solarex solar ARRAY is comprised of a number of UNIPANELS which are interconnected in a particular series—parallel combination and mounted on a rigid frame to produce a desired peak power output at a particular voltage and current as in fig. 1. The frame is usually provided with adjustable length brackets so that the tilt-angle with respect to the sun and/or local site conditions may be varied. Anodized aluminum with enamel painted surfaces is generally used for maximum resistance to corrision, high strength-to-weight ratio and reasonable cost. When needed, Solarex POWERMIZER ™ charge control circuitry [2] is available with the ARRAY consistent with optimum battery charging design.

[1] See Solarex Solar Cell Data Sheet
[2] See Solarex Powermizer Data Sheet

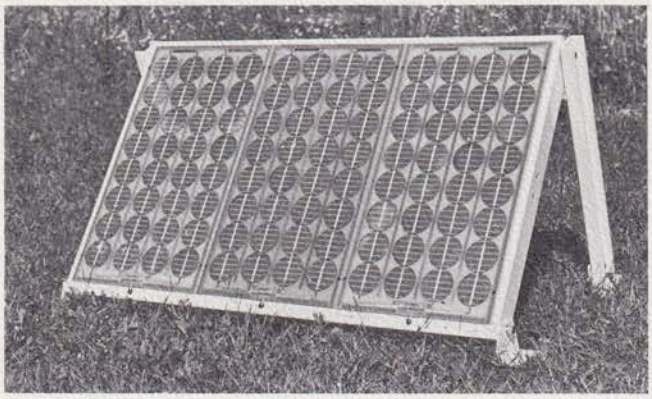

Fig. 2 18 Watt Array of Type 260 Unipanels

SOLAR ELECTRIC GENERATORS

Solarex solar electric GENERATORS are systems which include solar arrays and means for storing electrical energy. The arrays are interconnected in series-parallel combinations to deliver large amounts of electrical energy to specified loads. Typical storage means are rechargeable batteries. Thus, Solarex solar electric GENERATORS provide electrical energy for night and day, year around operation.

TYPES OF UNIPANELS

As previously described, UNIPANELS contain a specific number and type of CHEVRON solar cells to produce a specific peak power output when exposed in full sun. With reference to the charts on the following page, it can be seen that the UNIPANELS are grouped by nominal output voltage, since all UNIPANELS of a given output voltage contain the same number of solar cells. However, the size and the efficiency of the cells is different in order to achieve the rated current and peak Watt output, the desired packing density, and cost.

- 12 Volt Unipanels—all contain 32 solar cells connected in series (Figs. 2 and 4)

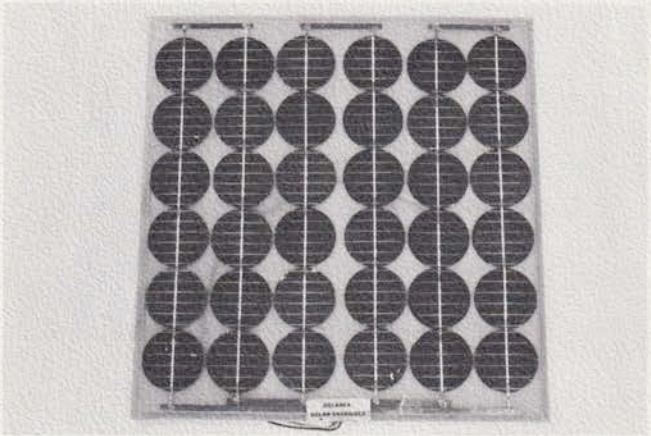

Fig. 3 Type 480 Unipanel

- 14 Volt Unipanels—all contain 36 solar cells connected in series (Figs. 3 and 4)

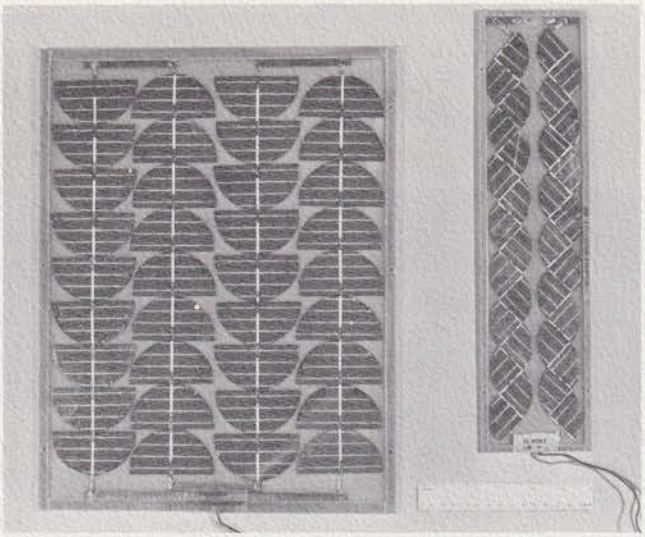

Fig. 4 Type 1480 Unipanel and Type 215 Unipanel

- 6 Volt and 9 Volt Unipanels—contain 16 and 24 solar cells respectively, connected in series (Fig. 5)

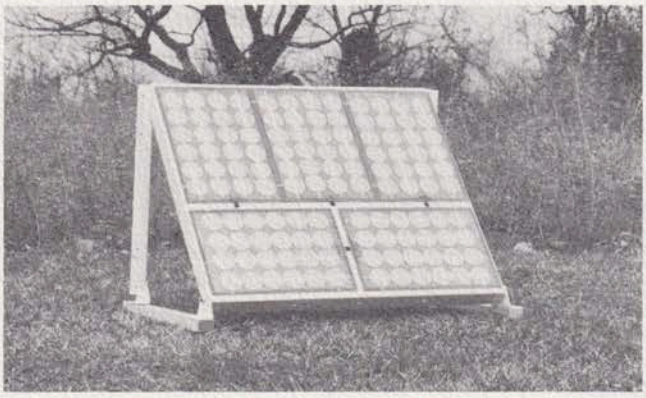

Fig. 5 25 Watt Array of Type 950 Unipanels

- 7 Volt Unipanels—all contain 18 solar cells connected in series (Fig. 6)

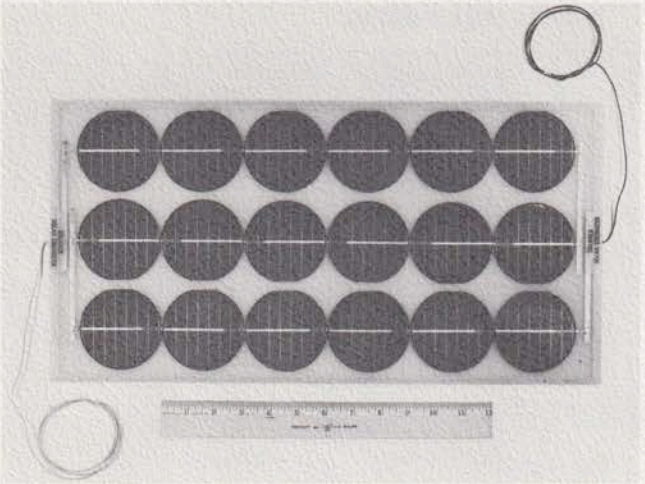

Fig. 6 Type 785 Unipanel

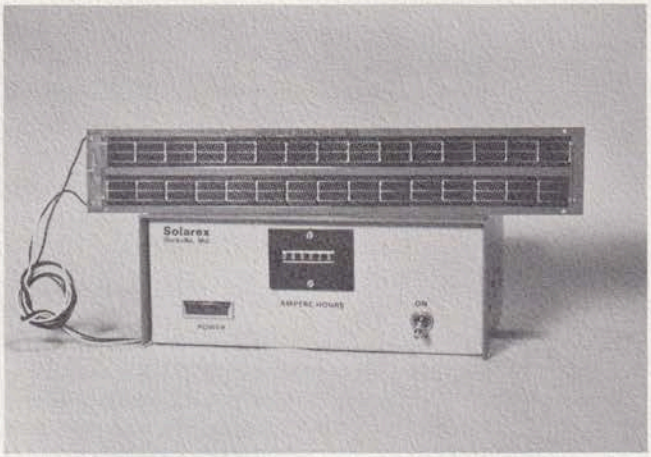

Fig. 7 Type 203 Unipanel with Ampere Hour Meter

UNIPANEL ARRAY MOUNTING HARDWARE

All Solarex UNIPANELS are designed to be easily mounted individually or in arrays by the customer on site on his own choice of frame or structural member by means of non-metallic fasteners, silicone rubber or other equivalent adhesives.

However, since factory mounting of UNIPANELS and ARRAYS is generally recommended and usually desired, Solarex offers specially designed hardware of the following configurations:

Single Unipanel—Type HP, Figs. 8 and 9

The UNIPANEL is secured by means of plastic screws and silicone rubber onto an enamel painted, anodized aluminum frame, with an adjustable tilt-angle bracket assembly that is adaptable for mounting directly on a pole or flat surface. Pole mounting may be accomplished by using a pair of stainless steel adjustable clamps (straps) fitted through slots provided in the bracket. Alternatively, the UNIPANEL may be screwed or bolted to a flat surface by utilizing the holes provided in the bracket. Adjustment of the tilt-angle between the mounting bracket and the frame is accomplished by means of a stainless steel bolt, nut and washer combination. Included on the reverse side of the frame is a low power charge control circuit encapsulated in a sealed junction box.

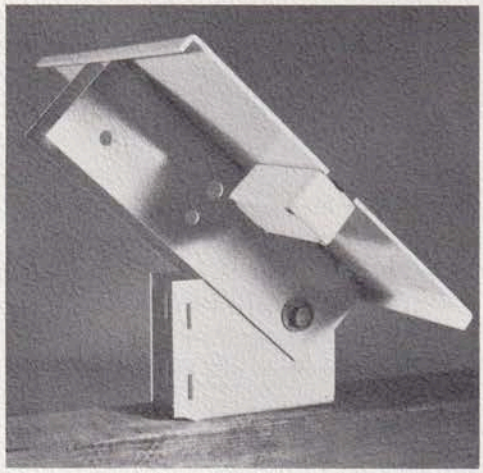

Fig. 8 Type 435 HP Unipanel (flat surface mounted)

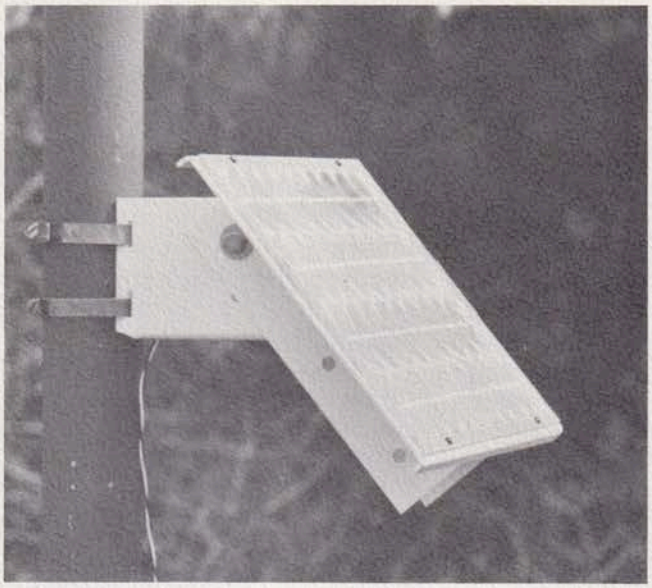

Fig. 9 Type 435 HP Unipanel (pole mounted)

Double Unipanel—Type HHP, Fig. 10

Same as HP above, but designed to accommodate two UNIPANELS.

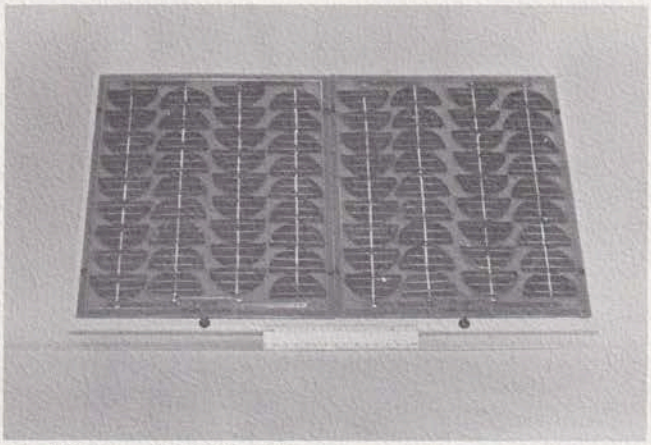

Fig. 10 Type 435 HHP Unipanel

ARRAYS (Multiple Unipanels), Figs. 1, 2, and 5

When three or more UNIPANELS are to be interconnected to form an ARRAY for a solar electric GENERATOR, they are secured by means of plastic screws and silicone rubber onto large enamel painted, anodized aluminum frames with adjustable length leg assemblies, which allow the tilt angle to be varied. The legs are adaptable for mounting on most any structural member or directly on the ground. A series of matching holes are provided in the telescoping leg assemblies, which along with stainless steel nut, bolt and washer combinations, allow the length of the legs to be varied, thus changing the tilt angle of the ARRAY frame. Pivotable feet with drilled holes are also included for the legs and the lower edge of the frame so that the ARRAY may be rigidly secured to a desired structure or the ground by means of suitable bolts or the like. ARRAY frames also lend themselves well to pole or tower mounting situations. Sealed junction boxes are attached on the reverse sides of the frames.

Typically, not more than ten full size UNIPANELS are mounted on a single frame, so as to minimize handling difficulties that could be encountered during shipping and installation.

For very large solar electric GENERATORS, multiple UNIPANEL/frame ARRAYS may be attached together, edge-to-edge to form a very rigid unitized system as in Fig. 11.

Fig. 11 360 Watt Solar Electric Generator Installation in Montana with Lexan* covered Type 260 and Type 280 Unipanels

MISCELLANEOUS ARRAY EQUIPMENT

In addition to the UNIPANEL mounting hardware, Solarex also has designed BIRD WIRES and LIGHTNING ARRESTORS for the ARRAYS when required for the overall efficient operation and protection of the solar electric system. Contact Solarex Corporation for specific engineering details and costs.

POWERMIZER™ CHARGE CONTROL CIRCUITS

Solarex has developed a variety of solar electric charge control circuits (regulators) which are specifically designed to be used in solar electric GENERATOR systems comprising UNIPANELS or ARRAYS and storage batteries. See Solarex POWERMIZER Data Sheet for details.

EXCLUSIVE FEATURES OF UNIPANEL DESIGN

- MODULAR solar electric systems—capable of upgrading on site to increase or change the power output of the Array by adding additional Unipanels and/or altering the interconnections of the Array.
- EASE OF REPAIR OF UNIPANEL—on site or at factory—unique silicone rubber encapsulation method allows for easy removal, repair and/or replacement of solar cells and/or cell interconnections.
- LIGHTWEIGHT construction—up to 4 Watts/lb.
- HIGH PACKING DENSITY—up to 6 Watts/sq. ft.
- MAXIMUM WEATHERABILITY—silicone rubber encapsulation of solar cells and internal wiring insures against corrosion or deterioration.
- HIGH WIND LOADING TOLERATION—Arrays capable of withstanding 50 lbs/sq. ft. wind loading.

Solarex is equipped to do complete systems design for any application. Contact Solarex Corporation for further technical details and pricing information.

SOLAREX UNIPANEL SPECIFICATIONS

12 VOLT UNIPANELS						
Type	215	230	260	1260	1270	280
Watts (peak) min.	1.5	3.0	6.0	6.0	7.0	8.0
Volts (nominal under load in full sun)	12	12	12	12	12	12
Volts (open circuit approx.)	17	17	17	17	17	17
Amps at nominal voltage (in full sun)	0.125	0.25	0.5	0.5	0.58	0.62
Ampere Hours/week (min. U. S. average)	3.78	7.7	16.0	16.0	18.0	19.0
Watt Hours/week (min. U.S. average)	45	100	200	200	220	240
Size (approx. in inches)	3.75 x 15	10 x 11	11 x 20	13.0 x 14	13.0 x 14	11 x 20
Weight (approx.)	300 gr. 0.7 lb.	590 gr. 1.3 lb.	1060 gr. 2.3 lb.	905 gr. 2.0 lb.	905 gr. 2.0 lb.	1060 gr. 2.3 lb.
Watts/sq. ft. (min.)	4.0	4.0	4.0	5.0	5.8	5.2

6 & 9 VOLT UNIPANELS		
Type	615	950
Watts (peak) min.	1.5	5.0
Volts (nominal under load in full sun)	6.0	9.0
Volts (open circuit approx.)	9.5	11.0
Amps at nominal voltage (in full sun)	0.25	0.5
Ampere Hours/week (min. U.S. average)	7.7	16.0
Watt Hours/week (min. U.S. average)	45	160
Size (approx. in inches)	5.5 x 10.75	9.75 x 14
Weight (approx.)	300 gr. 0.7 lb.	800 gr. 1.8 lb.
Watts/sq. ft. (min.)	3.7	5.3

14 VOLT UNIPANELS					
Type	435	470	480	1470	1480
Watts (peak) min.	3.5	7.0	8.0	7.0	8.0
Volts (nominal under load in full sun)	14	14	14	14	14
Volts (open circuit approx.)	19	19	19	19	19
Amps at nominal voltage (in full sun)	0.25	0.5	0.62	0.5	0.58
Ampere Hours/week (min. U. S. average)	7.7	16.0	19.0	16.0	18.0
Watt Hours/week (min. U. S. average)	105	220	270	220	260
Size (approx. in inches)	10 x 12	15.0 x 15.5	15.0 x 15.5	13.0 x 15.75	13.0 x 15.75
Weight (approx.)	640 gr. 1.4 lb.	1150 gr. 2.5 lb.	1150 gr. 2.5 lb.	970 gr. 2.1 lb.	970 gr. 2.1 lb.
Watts/sq. ft. (min.)	4.2	4.4	5.0	5.0	5.8

7 VOLT UNIPANELS			
Type	670	770	785
Watts (peak) min.	7.0	7.0	8.5
Volts (nominal under load in full sun)	7	7	7
Volts (open circuit approx.)	9.5	9.5	9.5
Amps at nominal voltage (in full sun)	1.0	1.0	1.2
Ampere Hours/week (min. U. S. average)	31.0	31.0	40
Watt Hours/week (min. U. S. average)	220	220	280
Size (approx. in inches)	15.0 x 15.5	10.25 x 20	10.25x 20
Weight (approx.)	1150 gr. 2.5 lb.	1060 gr. 2.3 lb.	1060 gr. 2.3 lb.
Watts/sq. ft. (min.)	4.4	4.9	6.0

MISCELLANEOUS UNIPANELS				
Type	Watts (peak)	mA	Description	Size (inches)
203	1.2	100 @ 12 Volts	Solar Electric Monitor	2.25 x 13
205	0.5	80 @ 6 Volts or 40 @ 12 Volts	Dual Voltage Panel	4 x 4

NOTE: All Solarex UNIPANELS are available with or without blocking diodes. When ordering with built-in blocking diodes, add suffix "D" after Unipanel number (e.g. 260D).

TESTING: The above UNIPANEL data was measured at 100mW/cm^2 (full sun or 2800° K min. tungsten light source) and 25° C.

SOLAREX CORPORATION

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