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DOE/ET/20279-187

DATA REPORT FOR THE
SOUTHWEST RESIDENTIAL EXPERIMENT STATION
JANUARY 1982

MASTER

23 February 1982

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Prepared for
THE U.S. DEPARTMENT OF ENERGY
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ABSTRACT

The Residential Experiment Stations of the Solar Photovoltaic Residential Project have been designed by Massachusetts Institute of Technology Lincoln Laboratory under Department of Energy sponsorship to develop residential photovoltaic systems and to gather and disseminate performance data for the photovoltaic community, cognizant institutions, and ultimately, the public.

The Southwest Residential Experiment Station (SW RES) is operated by the New Mexico Solar Energy Institute at New Mexico State University in Las Cruces. This report tabulates physical performance data obtained from the photovoltaic energy systems under test at the SW RES for the month of January 1982.

DATA REPORT FOR THE
SOUTHWEST RESIDENTIAL EXPERIMENT STATION
JANUARY 1982

The New Mexico Solar Energy Institute, under the management of the Massachusetts Institute of Technology (MIT) Lincoln Laboratory, has established a Residential Experiment Station in Las Cruces, New Mexico, to monitor the performance of state-of-the-art residential solar photovoltaic (PV) systems. This Southwest Residential Experiment Station (SW RES) is one of two Residential Experiment Stations funded under the U.S. Department of Energy's National Photovoltaic Program--the other is the Northeast Residential Experiment Station (NE RES) established and operated by MIT Lincoln Laboratory in Concord, Massachusetts.

This report presents one month of performance data obtained from the eight SW RES Prototype Systems. Data drawn from the Residential Data System (RDS) appears in several formats. Section 1 includes a one-page summary as well as a more detailed hour-by-hour tabulation for an average day of the month. In Section 2, energy histograms for each Prototype System are provided; they are based on RDS data and recording kilowatt hour meters. The histograms also present horizontal and plane-of-array insolation data as well as comments that explain data and/or energy production anomalies.

This report is distributed to the SW RES Consulting Committee, the other field centers in the National Photovoltaic Program, the Jet Propulsion Laboratory lead center, the Department of Energy (DOE), and, through DOE/Technical Information Center, the technical community involved in the development of PV energy systems. The objective of this report is to disseminate authoritative and accurate information concerning the performance of residential PV systems and the typical loads they serve. Such timely information is needed by the overall DOE PV program to ensure a uniform and correct understanding of the performance of the developmental systems.

Presently eight prototype residential PV systems are under test at the SW RES. Each Prototype System consists of a roof-mounted PV array, sized to meet at least 50 percent of the annual electric demand of an

energy-conserving house, and an enclosed structure to house the remainder of the PV system equipment, test instrumentation, and work space. All eight of these Prototype Systems were designed and built by industry participants in the SW RES effort. The arrays provide dc energy, which is converted to ac energy by power conditioning equipment to service all of the usual loads of the residence. A common feature of all the Prototype Systems is that excess solar-generated electric energy is fed back to the local utility grid, thereby eliminating the need for on-site storage. To quantitatively gauge the ability of the Prototype Systems to meet residential load demands, five homes in the vicinity of the SW RES, representative of the occupancy and loads found in the area, have been equipped with instrumentation that continually measures the home's electrical energy consumption. Telephone lines carry load information from these monitored residences to the SW RES, where the data is assimilated and recorded. One of the monitored houses is chosen to command a programmable load in each Prototype PV System--thereby simulating a typical residential electrical load profile.

Features of the residential PV systems and monitored houses are listed in Tables 1 and 2, respectively.

Figure 1 illustrates the sequence by which the attached monthly data reports are generated from the data obtained from the PV systems and monitored houses. The hour-by-hour tabulation of information for an average day of the month (see "Brief Monthly Report") and the monthly summary (see "Monthly Summary") are the end products of processing data measured every five seconds and averaging it over six-minute intervals. The quantities measured at the monitored houses are intended for use by both electric utilities and PV system designers. This information will be particularly useful in the numerical simulation of PV system performance and in determining the system's ability to meet actual residential loads. The information concerning the Prototype Systems is also addressed to PV system designers and electric utilities, as well as to institutional observers and the institutions represented on the RES Consulting committees. It is expected that this information will provide a basis for understanding the performance implications for the various design differences among the Prototype Systems.

It is to be noted that the "Monthly Summary" tabulations are based on data obtained for complete days only, where a complete day is defined as one where data exist for at least 23 hours. In contrast, the "Brief Monthly Report" is based on data obtained not only for complete days but also for days where data exist for less than 23 hours. It is worthy of remark that when different components and instrumentation in the PV system fail at different times, the hour-by-hour tabulations of the different physical quantities affected by it are obtained by averaging over different time periods. Cognizance has to be taken of this, especially in using the "Brief Monthly Report" to evaluate component efficiencies or to do an energy balance (using the hypothetical energy flows to and from the utility).

Additional information on the retrieval, processing, and dissemination of data collected by the RDS has been reported in a recent DOE publication entitled Information Gathering, Data Reduction, and Information Dissemination for Residential Experiment Station Operations, (Report No. DOE/ET/20279-141, June 1981) authored by P. Raghuraman and E. C. Kern of MIT Lincoln Laboratory. Copies of this publication are available through the National Technical Information Service. Information concerning the reliability and durability of the various residential systems, as well as assessments of their performance vis-à-vis the DOE price goals and milestones, will be presented in annual reports.

For additional information on the photovoltaic system activity at MIT Lincoln Laboratory, please write to the address below:

Solar Photovoltaic Residential Project
MIT Lincoln Laboratory
Room D-437
Lexington, MA 02173

For additional information on the photovoltaic system activity at NMSEI, please write to the following address:

Information and Education Division
New Mexico Solar Energy Institute
New Mexico State University
Box 3 SOL
Las Cruces, NM 88003

TABLE 1
 FEATURES OF THE PHOTOVOLTAIC ENERGY SYSTEMS
 IN THE SOUTHWEST RES PROTOTYPES

Prototype System	Module Supplier	Array Area (m ²)	Array Peak Power (kWp)	Mounting Method	Array Tilt (°)	Inverter Supplier	Inverter Size (kva)
ARCO Solar	ARCO Solar	87.8	7.4	Direct	25	Windworks	8
ARTU	ARCO Solar	53.5	4.9	Standoff	45	Windworks	8
BDM	Motorola	54.0	4.4	Standoff	35	Abacus/ Helionetics*	6
General Electric	General Electric	74.3	6.7	Direct	26.6	Abacus	6
Solarex	Solarex	67.8	5.1**	Standoff	26	Abacus	6
TEA	Motorola	49.4	4.2	Rack	26	Abacus	6
TriSolarCorp	Applied Solar	58.0	5.2	Integral	30	Windworks	8
Westinghouse	ARCO Solar	70.8	5.5	Integral	30	Abacus	6

*A DECC inverter built by Delta Division of Helionetics was installed in place of a failed Abacus inverter on 28 January 1982.

**Recent measurements have shown Solarex array peak power to be 5.1 kWp. The number shown in previous SW RES monthly data reports is incorrect.

TABLE 2
MONITORED HOUSE (MH) FEATURES

	MH1	MH2	MH3	MH4	MH5
Occupants	5	3	4	4	2
Working adults (daytime)	1	1	2	2	Retired
Size/Type of home	2,060 ft ² single family detached	2,400 ft ² single family detached	2,650 ft ² single family detached	1,700 ft ² single family detached	1,600 ft ² attached town house
Space Heating System	Electric/solar	Heat pump	Electric	Natural gas	Heat pump
Cooling System	Evaporative	Heat pump	Evaporative	Evaporative	Heat pump
Domestic Hot Water System	Solar/electric backup	Electric	Electric	Electric	Solar/electric backup
Cooking	Electric	Electric	Electric	Electric	Electric
Clothes Drying	Electric	Electric	Electric	Electric	Electric

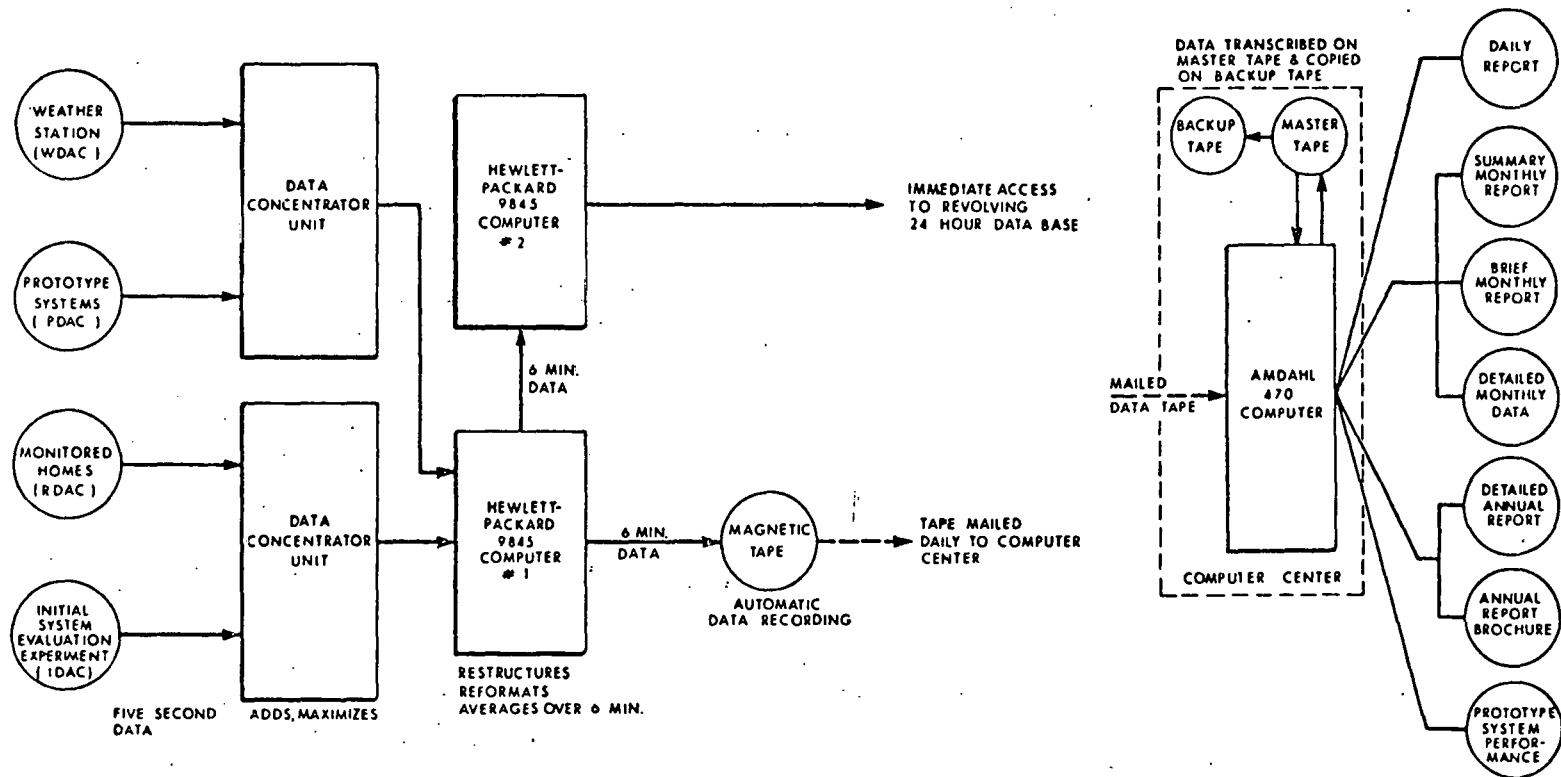


Figure 1. Flow Chart for Data Acquisition and Reporting of RES Operations

SECTION 1

RDS DATA FOR JANUARY

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MONTHLY SUMMARY
(Based on Complete Days Only*)

SW RES MONTHLY SUMMARY

Month: January Year: 1982

SW RES Site Location
Latitude: 32°17' N
Longitude: 106°45' W
Elevation: 1,198 meters

<u>METEOROLOGICAL INFORMATION</u>	<u>SW RES</u>
Average maximum ambient air temp. (°C).....	13.51
Average minimum ambient air temp. (°C).....	-0.38
Average ambient air temp. (°C).....	6.56
Average degree days (°C day).....	-11.87
Total precipitation (cm).....	1.12
Average wind speed (m/s).....	2.85
Average total horizontal insolation (kWh/m ² /day).....	3.44

<u>MONITORED HOUSE (MH) INFORMATION</u>	<u>MH1</u>	<u>MH2</u>	<u>MH3</u>	<u>MH4</u>	<u>MH5</u>
Average total electric energy used (kWh/day).....	75.82	65.13	106.90	30.51	47.26
Average electric energy use: sunhours (kWh/day).....	39.93	29.82	43.88	13.70	24.46

NUMBER OF COMPLETE DAYS OF MH DATA*.....28 28 20 28 9

<u>PROTOTYPE PHOTOVOLTAIC ARRAY INFORMATION</u>	<u>TSC</u>	<u>SX</u>	<u>ARTU</u>	<u>ARCO</u>	<u>TEA</u>	<u>BDM</u>	<u>GE</u>	<u>WST</u>
Average PV DC energy (kWh/day).....	26.24	21.49	27.35	32.57	20.24	23.37	28.00	24.44
Average PV DC energy/rated power (kWh/day/kWp).....	5.05	4.21	5.58	4.40	4.82	5.31	4.18	4.44
Maximum array peak power (kW).....	6.93	5.13	6.97	7.95	5.59	5.50	7.78	4.01
Average array peak power (kW).....	5.10	4.28	4.94	6.26	4.09	4.96	5.69	3.97
Average total tilt insolation: sunhours (kWh/m ² /day).....	5.41	5.17	5.89	5.08	5.13	5.62	5.22	5.41
Insolation during system on hours/total insolation (%).....	97.61	88.31	96.00	95.00	92.93	99.46	89.72	97.44
Maximum peak insolation (kW/m ²).....	1.35	1.29	1.39	1.32	1.37	1.33	1.34	1.33
Average peak insolation (kW/m ²).....	1.03	0.99	1.10	0.97	0.99	1.03	1.00	1.02
PV array efficiency (%).....	8.52	6.69	8.63	7.34	8.52	7.89	8.03	6.56
Average maximum panel temp. (°C).....	36.29	50.54	42.77	45.86	37.79	46.50	52.32	43.40
Average minimum panel temp. (°C).....	-2.75	-3.90	-1.81	-4.46	-3.82	-3.19	-4.50	-3.19

<u>PROTOTYPE POWER CONDITIONING UNIT (PCU) INFORMATION</u>	<u>TSC</u>	<u>SX</u>	<u>ARTU</u>	<u>ARCO</u>	<u>TEA</u>	<u>BDM</u>	<u>GE</u>	<u>WST</u>
Average PCU AC energy output (kWh/day).....	24.58	18.07	24.20	29.56	16.62	21.08	23.53	20.31
Average PCU AC peak power output (kW).....	4.81	3.64	4.42	5.71	3.48	4.51	4.81	3.36
Maximum PCU AC peak power output (kW).....	6.60	4.47	6.20	7.22	4.74	4.99	6.48	3.50
PCU efficiency (%).....	94.16	82.35	88.27	90.82	80.64	90.70	82.96	83.17

<u>PROTOTYPE AC ENERGY FLOW</u>	<u>TSC</u>	<u>SX</u>	<u>ARTU</u>	<u>ARCO</u>	<u>TEA</u>	<u>BDM</u>	<u>GE</u>	<u>WST</u>
Average imposed load 5 a.m. to 8 p.m. (kWh/day)**.....	41.96	43.50	40.36	36.96	40.70	49.75	41.85	35.42
Average energy supplied to utility feed (kWh/day).....	14.50	9.22	13.84	18.84	9.32	8.21	13.25	10.77
Average energy supplied by utility feed (kWh/day).....	32.31	34.91	30.57	26.81	33.86	37.72	31.23	26.44

NUMBER OF COMPLETE DAYS OF PROTOTYPE DC AND AC DATA+ 26 16 27 23 24 3 17 12

NUMBER OF COMPLETE DAYS OF PROTOTYPE LOAD, UTILITY DATA† 24 16 27 23 17 3 17 12

*A complete day is defined as more than 23 hours of data collected.

**Load imposed by MH2 - 1 day; MH3 - 12 days; MH4 - 15 days.

+A complete day is defined as more than 23 hours of dc and ac data available for comparison.

†A complete day is defined as more than 23 hours of load, energy to utility, and energy from utility data available for comparison.

Notes: No data collected 0800 6 January to 0830 7 January. No imposed load or power to or from utility data 20-21 January due to systemwide tests.

Weather station data collected for only 24 days due to data transmission problems.

MH3 off-line 11-15 and 30-31 January due to data acquisition/transmission problems.

MH5 on-line beginning 22 January.

TSC on-line all month. No data 3, 12, or 15 January due to data acquisition problems.

SX off-line 21-31 January due to the Abacus inverter failure of 20 January.

ARTU on-line almost all month. Array fuse blown on 20 January during special testing.

ARCO off-line partial days 20, 22, and 29-30 January due to tripped array circuit breaker. No data 16 January due to testing. No imposed load or power to or from utility data 22 January.

TEA on-line until 30 January. Abacus inverter failure. Off-line partial day 26 January due to data acquisition repair work. No imposed load or energy to or from utility data 18-26 January due to bad transducer.

BDM off-line 1-27 January due to Abacus inverter failure. New DECC inverter installed 28 January.

GE off-line 22-31 January. Abacus inverter failure. Off-line partial day 21 January for tests (unrelated to failure).

WST off-line 17-31 January due to Abacus inverter failure. No data 7 January due to calibration procedure.

Insolation data 24-31 January taken from TSC as WST pyranometer was out for calibration. Maximum power point tracker malfunctioning most of the month.

BRIEF MONTHLY REPORT (Including Partial Days)

MONTHLY REPORT FOR MONITORED HOUSES

MONTHLY HOURLY AVERAGE
JANUARY 1982

TOTAL ELECTRIC ENERGY USED (KWH) ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME																										
HOURLY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	2.43	2.02	1.58	1.58	2.03	2.67	3.38	4.79	4.95	5.05	4.13	4.18	3.82	3.19	3.09	2.88	3.23	4.09	3.11	2.20	2.32	2.69	2.97	3.22	75.65	
MH2	1.70	1.52	1.32	1.52	2.40	2.85	2.94	3.78	3.69	2.58	2.33	2.45	2.51	3.50	3.35	2.59	2.33	3.23	2.85	3.47	3.61	3.07	2.68	1.63	64.46	
MH3	1.78	2.54	2.52	3.15	3.67	4.61	9.78	10.30	6.36	5.06	4.61	4.84	3.80	2.51	1.98	1.85	3.05	4.41	5.47	5.50	4.78	5.53	5.12	2.07	106.38	
MH4	0.87	0.73	0.65	0.61	0.62	0.57	0.66	1.36	1.71	1.54	1.27	1.43	1.06	1.15	1.17	1.35	1.35	1.48	1.99	1.99	2.07	2.03	1.56	1.23	30.55	
MH5	1.53	0.85	0.93	1.06	1.22	1.64	2.39	6.20	5.51	3.41	2.73	1.98	1.14	0.99	0.92	1.45	0.93	1.23	2.60	2.08	1.74	1.93	2.21	2.28	48.92	

MONTHLY REPORT FOR PROTOTYPES

MONTHLY HOURLY AVERAGE
JANUARY 1982

DC ARRAY OUTPUT (KWH) ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME																										
HOURLY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
TSC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.25	1.54	2.64	3.46	3.97	4.01	3.58	3.20	2.35	1.17	0.10	0.0	0.0	0.0	0.0	0.0	0.0	26.26	
SX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11	1.04	2.13	2.95	3.32	3.37	2.91	2.43	1.61	0.62	0.02	0.0	0.0	0.0	0.0	0.0	0.0	20.41	
ARTU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.31	1.64	2.30	3.41	3.88	3.86	3.44	3.24	2.46	1.27	0.14	0.0	0.0	0.0	0.0	0.0	0.0	26.44	
ARCO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.19	1.52	3.12	4.21	5.05	5.22	4.47	3.78	2.60	1.11	0.07	0.0	0.0	0.0	0.0	0.0	0.0	31.35	
TBA	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.18	1.14	1.87	2.51	2.81	3.06	2.77	2.38	1.74	0.91	0.07	0.00	0.00	0.00	0.00	0.00	0.00	19.34	
BDM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.34	1.49	2.32	2.45	3.57	3.24	3.05	3.08	2.36	1.25	0.21	0.0	0.0	0.0	0.0	0.0	0.0	23.36	
GE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.18	1.51	2.78	3.75	4.18	4.37	3.88	3.14	2.08	0.95	0.02	0.0	0.0	0.0	0.0	0.0	0.0	26.72	
WST	0.00	0.00	0.0	0.00	0.00	0.00	0.00	0.20	1.38	2.62	3.10	3.27	3.38	3.08	2.77	2.02	0.92	0.07	0.0	0.0	0.0	0.0	0.0	0.0	22.83	

MONTHLY HOURLY AVERAGE JANUARY 1982

AC INVERTER - REAL ENERGY OUTPUT (KWH) ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME																										
HOURLY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
TSC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.23	1.44	2.47	3.24	3.73	3.76	3.35	3.00	2.20	1.03	0.10	0.0	0.0	0.0	0.0	0.0	0.0	24.59	
SX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.05	0.81	1.50	2.44	2.84	2.87	2.48	2.04	1.34	0.48	0.00	0.0	0.0	0.0	0.0	0.0	0.0	17.12	
ARTU	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.25	1.43	2.48	3.03	3.46	3.43	3.05	2.87	2.17	1.03	0.10	0.00	0.00	0.00	0.00	0.00	0.00	23.38	
ARCO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.15	1.35	2.83	3.84	4.61	4.76	4.07	3.44	2.34	0.97	0.05	0.0	0.0	0.0	0.0	0.0	0.0	28.42	
TBA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.07	0.85	1.61	2.09	2.45	2.59	2.34	1.99	1.42	0.53	0.03	0.0	0.0	0.0	0.0	0.0	0.0	16.02	
BDM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.26	1.33	2.11	2.22	3.25	2.94	2.77	2.81	2.14	1.13	0.14	0.0	0.0	0.0	0.0	0.0	0.0	21.07	
GE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.10	1.21	2.34	3.18	3.54	3.70	3.30	2.67	1.75	0.65	0.01	0.0	0.0	0.0	0.0	0.0	0.0	22.46	
WST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.12	1.10	2.19	2.60	2.73	2.83	2.59	2.31	1.68	0.73	0.03	0.0	0.0	0.0	0.0	0.0	0.0	18.89	

MONTHLY HOURLY AVERAGE JANUARY 1982

LOAD IMPOSED ON THE PROTOTYPE (KWH) ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME																										
HOURLY	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
TSC	0.0	0.0	0.0	0.0	0.0	2.12	4.85	5.30	3.50	2.54	2.17	2.39	1.90	1.51	1.51	1.42	2.35	2.45	4.01	3.47	0.49	0.0	0.0	0.0	41.96	
SX	0.0	0.0	0.0	0.0	0.0	2.17	3.52	3.80	3.57	2.17	2.58	2.93	2.46	2.13	1.91	1.78	2.43	2.58	3.94	3.43	0.51	0.0	0.0	0.0	41.99	
ARTU	0.0	0.0	0.0	0.0	0.0	1.89	4.25	4.87	3.44	2.35	2.09	2.31	1.92	1.59	1.54	1.38	2.17	2.29	3.74	3.24	0.45	0.0	0.0	0.0	39.51	
ARCO	0.0	0.0	0.0	0.0	0.0	1.61	4.06	4.62	3.00	1.94	2.06	2.25	1.88	1.49	1.46	1.10	1.53	2.24	3.37	2.96	0.12	0.0	0.0	0.0	36.07	
TBA	0.0	0.0	0.0	0.0	0.0	1.76	3.88	5.16	3.61	1.88	1.97	2.01	2.18	1.61	1.50	1.41	2.15	2.03	4.21	3.53	0.51	0.0	0.0	0.0	39.15	
BDM	0.00	0.0	0.0	0.0	0.0	2.65	2.23	2.25	4.14	4.99	3.54	2.76	1.43	2.14	2.50	2.22	5.12	3.17	5.11	5.42	0.58	0.00	0.00	0.00	50.26	
GE	0.0	0.0	0.0	0.0	0.0	2.10	3.77	4.15	3.85	2.47	2.40	2.70	2.51	1.90	1.51	1.38	2.03	2.16	3.69	3.15	0.47	0.0	0.0	0.0	40.20	
WST	0.0	0.0	0.0	0.0	0.0	1.64	2.25	3.24	2.87	1.45	1.95	2.45	2.29	1.99	1.50	1.55	1.93	1.87	3.56	3.02	0.43	0.0	0.0	0.0	33.92	

MONTHLY REPORT FOR PROTOTYPES
 MONTHLY HOURLY AVERAGE
 JANUARY 1982

ENERGY SUPPLIED TO UTILITY (KWH)
 ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
TSC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.52	1.46	1.67	2.15	2.40	2.21	1.81	1.45	0.45	0.01	0.0	0.0	0.0	0.0	0.0	0.0	14.56
SX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.22	0.95	1.31	1.43	1.45	1.27	1.16	0.80	0.15	0.00	0.0	0.0	0.0	0.0	0.0	0.0	8.74
ARTU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03	0.56	1.43	1.84	1.95	2.09	1.87	1.73	1.40	0.47	0.01	0.0	0.0	0.0	0.0	0.0	0.0	13.37
ARCO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.53	1.79	2.57	2.90	3.24	2.75	2.22	1.61	0.43	0.00	0.0	0.0	0.0	0.0	0.0	0.0	18.12
T&A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.22	0.97	1.32	1.52	1.39	1.27	1.16	0.83	0.17	0.00	0.0	0.0	0.0	0.0	0.0	0.0	8.86
BDM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11	0.43	0.66	0.47	1.19	1.64	1.32	1.14	1.00	0.21	0.00	0.0	0.0	0.0	0.0	0.0	0.0	8.17
GE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.41	1.37	1.88	1.96	2.02	1.80	1.68	1.18	0.33	0.00	0.0	0.0	0.0	0.0	0.0	0.0	12.61
RST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.41	1.34	1.58	1.41	1.44	1.24	1.34	1.02	0.23	0.00	0.0	0.0	0.0	0.0	0.0	0.0	10.09

MONTHLY HOURLY AVERAGE
 JANUARY 1982

ENERGY SUPPLIED BY UTILITY (KWH)
 ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
TSC	0.04	0.04	0.04	0.04	0.04	2.15	4.88	5.10	2.56	1.51	0.93	0.76	0.51	0.30	0.43	0.65	1.71	2.39	4.04	3.50	0.52	0.03	0.04	0.04	32.33
SX	0.02	0.02	0.02	0.02	0.02	2.18	3.52	3.76	2.96	1.35	1.50	1.55	1.03	0.94	1.05	1.25	2.11	2.59	3.94	3.43	0.65	0.01	0.02	0.02	33.93
ARTU	0.02	0.02	0.02	0.02	0.02	1.91	4.27	4.69	2.51	1.35	0.93	0.81	0.62	0.44	0.48	0.66	1.53	2.26	3.76	3.25	0.46	0.01	0.02	0.02	30.12
ARCO	0.02	0.02	0.02	0.02	0.02	1.63	4.09	4.50	2.18	0.96	0.75	0.56	0.40	0.21	0.34	0.42	1.20	2.23	3.40	2.91	0.44	0.02	0.02	0.02	26.37
T&A	0.01	0.01	0.01	0.01	0.01	1.83	3.99	5.22	3.05	1.20	1.12	0.91	0.95	0.62	0.46	0.90	1.92	2.12	4.32	3.62	0.54	0.01	0.01	0.01	32.76
BDM	0.05	0.05	0.05	0.05	0.05	2.66	2.27	2.12	3.27	3.57	1.52	0.72	0.16	0.71	0.85	1.10	4.25	3.06	5.15	5.46	0.62	0.05	0.05	0.05	38.20
GE	0.01	0.01	0.01	0.01	0.01	2.12	3.79	4.07	3.00	1.43	1.09	1.03	0.75	0.43	0.51	0.78	1.61	2.17	3.71	3.17	0.49	0.02	0.01	0.01	30.25
RST	0.03	0.03	0.03	0.03	0.03	1.66	2.28	3.16	2.20	0.82	0.94	1.15	0.92	0.67	0.55	0.90	1.43	1.87	3.54	3.04	0.50	0.03	0.03	0.03	25.68

MONTHLY HOURLY AVERAGE
 JANUARY 1982

MAXIMUM INVERTER AC POWER (KW)
 MAX POWER FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
TSC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.81	2.15	3.07	3.81	4.14	4.19	4.03	3.47	2.90	1.62	0.34	0.3	0.0	0.0	0.0	0.0	0.0	0.0
SX	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.33	1.43	2.25	2.66	3.11	3.09	2.91	2.39	1.96	0.83	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ARTU	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.84	2.12	3.02	3.52	3.81	3.75	3.66	3.22	2.78	1.55	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.0
ARCO	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.66	2.24	3.56	4.53	5.04	5.09	4.82	4.02	3.15	1.61	0.20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
T&A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.35	1.39	2.06	2.61	2.85	2.93	2.81	2.36	1.92	0.99	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BDM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.92	1.80	2.70	2.85	3.33	3.57	3.75	3.37	2.73	1.43	0.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.49	2.00	2.39	2.76	4.00	4.09	3.85	3.10	2.64	1.19	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0
RST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.54	1.82	2.58	2.90	2.97	2.92	2.92	2.59	2.42	1.11	0.14	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MONTHLY HOURLY AVERAGE
 JANUARY 1982

TOTAL TILT INSULATION (KWH/M**2)
 ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
TSC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.53	0.70	0.82	0.85	0.75	0.62	0.44	0.22	0.03	0.00	0.00	0.00	0.00	0.00	0.00	5.41
SX	0.0	0.00	0.0	0.0	0.00	0.0	0.00	0.06	0.30	0.48	0.65	0.77	0.79	0.71	0.60	0.42	0.21	0.03	0.0	0.0	0.00	0.00	0.0	0.0	5.01
ARTU	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.33	0.53	0.71	0.85	0.84	0.80	0.61	0.51	0.29	0.04	0.00	0.00	0.00	0.00	0.00	0.00	5.71
ARCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.30	0.48	0.64	0.75	0.78	0.69	0.58	0.41	0.23	0.03	0.0	0.0	0.00	0.00	0.00	0.00	4.92
T&A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.30	0.49	0.65	0.76	0.79	0.70	0.58	0.41	0.23	0.03	0.0	0.0	0.00	0.00	0.00	0.00	4.37
BDM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.31	0.41	0.67	0.82	0.84	0.76	0.66	0.49	0.25	0.04	0.00	0.00	0.00	0.00	0.00	0.00	5.44
GE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.07	0.31	0.50	0.67	0.78	0.80	0.71	0.59	0.41	0.23	0.02	0.0	0.0	0.00	0.00	0.00	0.00	5.06
RST	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.32	0.49	0.66	0.76	0.82	0.72	0.59	0.42	0.21	0.02	0.0	0.0	0.00	0.00	0.00	0.00	5.36

BRIEF MONTHLY REPORT FOR MONITORED HOUSE

MONTHLY HOURLY AVERAGE
JANUARY 1982

ARCO - HYPOTHETICAL ENERGY TO UTILITY IF ARCO WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOURL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.17	0.37	1.24	1.67	1.99	1.77	1.38	0.81	0.14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.53
MH2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.25	1.39	2.44	2.74	2.82	1.86	1.60	1.05	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.35
MH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.13	0.86	1.38	2.14	2.46	2.55	2.09	1.47	0.33	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.62
MH4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.48	1.71	2.82	3.39	3.74	3.05	2.40	1.33	0.33	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.32
MH5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.12	0.65	2.10	3.82	4.55	4.32	3.56	1.83	0.73	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.75

MONTHLY HOURLY AVERAGE
JANUARY 1982

ARTU - HYPOTHETICAL ENERGY TO UTILITY IF ARTU WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOURL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.15	0.30	0.85	1.00	1.14	1.10	0.89	0.67	0.15	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.36
MH2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.30	1.10	1.66	1.67	1.62	1.12	1.11	0.82	0.23	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.64
MH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11	0.64	0.91	1.34	1.39	1.56	1.61	1.27	0.33	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.16
MH4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.56	1.37	2.02	2.35	2.51	2.14	1.82	1.24	0.43	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.84
MH5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.12	0.35	0.96	2.06	2.61	2.58	2.41	1.54	0.84	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.54

MONTHLY HOURLY AVERAGE
JANUARY 1982

BDM - HYPOTHETICAL ENERGY TO UTILITY IF BDM WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOURL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00	0.30	0.77	0.73	1.01	1.14	1.07	0.72	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.76
MH2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.40	0.76	0.79	1.51	1.53	0.96	0.53	0.40	0.33	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.27
MH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.56	0.71	2.43	0.95	0.72	1.63	1.47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.66
MH4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.72	0.74	0.74	2.43	2.26	2.04	2.11	1.44	0.67	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.19
MH5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.11	0.33	1.33	1.84	1.85	1.73	1.06	0.43	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.93

MONTHLY HOURLY AVERAGE
JANUARY 1982

GE - HYPOTHETICAL ENERGY TO UTILITY IF GE WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOURL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.12	0.29	0.74	0.99	1.14	1.22	1.02	0.58	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.19
MH2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.24	1.23	1.92	1.89	1.84	1.11	1.10	0.64	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.09
MH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.07	0.38	0.70	1.07	1.38	1.92	1.19	0.74	0.17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.62
MH4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.44	1.40	2.16	2.39	2.56	2.16	1.73	1.03	0.25	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.15
MH5	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BRIEF MONTHLY REPORT FOR MONITORED HOUSE

MONTHLY HOURLY AVERAGE
JANUARY 1982

SX - HYPOTHETICAL ENERGY TO UTILITY IF SX WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOURL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.05	0.18	0.48	0.63	0.71	0.73	0.62	0.31	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.71
MH2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11	0.81	1.29	1.40	1.31	0.77	0.78	0.39	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.90
MH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.04	0.24	0.39	0.70	0.34	1.25	0.81	0.49	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.81
MH4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.23	0.99	1.50	1.79	1.81	1.47	1.18	0.69	0.11	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.30
MH5	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MONTHLY HOURLY AVERAGE
JANUARY 1982

TEA - HYPOTHETICAL ENERGY TO UTILITY IF TEA WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOURL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.14	0.44	0.63	0.65	0.60	0.44	0.26	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.26
MH2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.52	1.03	1.21	1.15	0.70	0.60	0.35	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.67
MH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03	0.30	0.43	0.70	0.86	1.06	0.97	0.68	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.13
MH4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.21	0.83	1.30	1.48	1.73	1.50	1.17	0.70	0.17	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.07
MH5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.17	0.65	1.47	1.81	1.73	1.53	0.94	0.40	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.74

MONTHLY HOURLY AVERAGE
JANUARY 1982

TSC - HYPOTHETICAL ENERGY TO UTILITY IF TSC WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOURL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.16	0.29	0.97	1.17	1.30	1.24	1.01	0.65	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.95
MH2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.01	0.26	1.05	1.72	1.80	1.89	1.32	1.12	0.80	0.21	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.28
MH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11	0.65	0.99	1.33	1.46	1.73	1.68	1.23	0.31	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.49
MH4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.03	0.55	1.32	2.16	2.51	2.77	2.39	2.03	1.23	0.45	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.45
MH5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.11	0.37	1.13	2.33	2.92	2.85	2.58	1.58	0.81	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.72

MONTHLY HOURLY AVERAGE
JANUARY 1982

WST - HYPOTHETICAL ENERGY TO UTILITY IF WST WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOURL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL	
MH1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.09	0.24	0.35	0.60	0.74	0.80	0.78	0.59	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.45
MH2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.25	1.09	1.39	1.29	1.03	0.62	0.86	0.64	0.12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.28
MH3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.26	0.33	0.75	0.86	1.15	0.73	0.44	0.11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.71
MH4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.02	0.43	1.39	1.68	1.64	1.68	1.49	1.36	1.02	0.27	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.98
MH5	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BRIEF MONTHLY REPORT FOR MONITORED HOUSE

MONTHLY HOURLY AVERAGE
JANUARY 1982

ARCO - HYPOTHETICAL ENERGY FROM UTILITY IF ARCO WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MH1	2.59	2.15	1.69	1.74	2.32	2.91	3.60	4.96	3.81	2.75	1.57	1.24	0.92	0.81	1.18	1.39	2.47	4.00	3.05	2.25	2.36	2.69	3.16	3.42	59.04
MH2	1.63	1.41	1.43	1.68	2.66	3.04	3.24	3.85	2.57	1.02	0.72	0.33	0.37	0.74	1.17	1.09	2.13	3.24	2.90	3.67	3.32	3.03	2.77	1.58	48.57
MH3	2.05	2.89	2.87	3.54	4.22	4.97	9.86	9.70	5.04	3.16	2.24	2.39	1.40	0.90	0.64	0.55	1.77	4.39	5.46	4.70	4.43	5.61	5.13	2.29	90.30
MH4	1.02	0.74	0.65	0.63	0.59	0.60	0.65	1.33	0.94	0.32	0.28	0.19	0.08	0.18	0.22	0.45	0.83	1.51	2.12	1.98	2.25	2.19	1.65	1.30	22.74
MH5	1.60	1.01	1.05	1.19	1.29	1.68	2.66	6.26	3.91	0.70	0.20	0.00	0.0	0.0	0.0	0.42	0.21	1.01	2.43	1.70	1.35	1.63	1.88	1.93	34.06

MONTHLY HOURLY AVERAGE
JANUARY 1982

ARTU - HYPOTHETICAL ENERGY FROM UTILITY IF ARTU WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MH1	2.46	2.06	1.58	1.60	2.07	2.74	3.46	4.73	3.82	2.98	1.94	1.69	1.44	1.15	1.27	1.45	2.33	4.06	3.09	2.19	2.33	2.71	3.01	3.20	59.42
MH2	1.61	1.38	1.31	1.54	2.45	2.92	3.04	3.58	2.47	1.22	1.02	0.71	0.71	1.47	1.55	1.30	2.13	3.09	2.84	3.54	3.59	3.01	2.72	1.67	50.85
MH3	1.85	2.61	2.58	3.23	3.78	4.73	9.81	10.00	5.20	3.26	2.82	2.68	1.77	1.05	0.63	0.78	2.24	4.43	6.16	5.43	4.77	5.61	5.12	2.13	92.42
MH4	0.87	0.73	0.65	0.62	0.62	0.58	0.65	1.23	0.95	0.41	0.33	0.28	0.16	0.23	0.24	0.46	0.75	1.42	1.98	1.96	2.10	2.05	1.57	1.24	22.11
MH5	1.53	0.85	0.93	1.07	1.22	1.64	2.39	5.89	3.87	1.11	0.57	0.29	0.10	0.08	0.01	0.36	0.25	1.13	2.59	2.08	1.74	1.93	2.21	2.28	36.21

MONTHLY HOURLY AVERAGE
JANUARY 1982

UDM - HYPOTHETICAL ENERGY FROM UTILITY IF UDM WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MH1	1.75	1.40	0.88	0.77	1.27	1.75	2.60	3.53	4.45	2.84	1.32	1.65	1.02	1.57	0.78	1.33	2.97	5.40	3.25	1.90	2.30	2.69	1.72	2.32	51.64
MH2	1.29	1.04	0.57	0.81	0.57	0.97	0.68	0.85	0.31	0.14	1.49	0.93	0.55	2.00	1.99	1.94	0.53	1.63	1.67	2.21	3.00	1.53	1.36	1.03	29.29
MH3	0.63	0.89	0.82	1.05	3.55	1.47	1.61	2.82	2.48	0.31	0.12	0.0	0.02	0.17	0.0	1.02	1.04	6.76	13.47	12.54	5.85	6.96	8.74	0.80	99.68
MH4	0.89	0.79	0.51	0.76	0.45	0.69	0.55	0.52	0.55	0.72	0.76	0.01	0.11	0.01	0.00	0.09	0.22	0.85	0.97	1.16	1.18	1.27	1.06	1.22	15.46
MH5	1.36	0.52	0.06	1.11	1.35	2.01	2.17	6.04	6.04	1.51	0.88	1.00	0.33	0.28	0.05	0.56	0.52	1.41	2.26	2.26	1.97	1.98	2.30	2.53	41.40

MONTHLY HOURLY AVERAGE
JANUARY 1982

GE - HYPOTHETICAL ENERGY FROM UTILITY IF GE WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MH1	2.50	2.24	1.82	1.92	2.45	2.95	3.60	5.05	4.13	3.15	2.14	1.90	1.61	1.24	1.38	1.68	2.93	3.88	2.93	2.22	2.27	2.75	3.23	3.48	63.61
MH2	2.06	1.98	1.57	1.53	2.29	3.14	3.48	4.50	2.92	1.21	0.74	0.47	0.59	1.63	1.85	1.63	2.73	3.83	3.42	3.56	3.77	3.62	3.46	1.90	57.77
MH3	2.38	3.01	2.89	3.89	4.30	5.41	9.30	8.79	5.47	3.42	2.46	3.04	1.75	1.34	1.16	1.40	2.53	4.71	6.46	5.66	5.41	6.15	5.50	1.94	98.52
MH4	1.08	0.75	0.71	0.63	0.67	0.58	0.67	1.27	0.93	0.45	0.39	0.36	0.18	0.23	0.33	0.49	1.01	1.75	2.32	2.36	2.27	2.27	1.73	1.30	24.76
MH5	0.0	0.0	0.0	0.0	0.3	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	0.0	0.0	0.0	0.0

BRISF MONTHLY REPORT FOR MONITORED HOUSE

MONTHLY HOURLY AVERAGE
JANUARY 1982

SX - HYPOTHETICAL ENERGY FROM UTILITY IF SX WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MH1	2.55	2.31	1.84	1.87	2.53	3.07	3.74	5.37	4.71	3.75	2.63	1.21	1.88	1.44	1.70	1.91	3.17	3.82	2.89	2.22	2.19	2.53	3.31	3.47	67.77
MH2	1.82	1.75	1.57	1.57	2.39	3.24	3.67	4.61	3.06	1.34	0.93	0.73	0.80	1.96	2.09	1.81	2.93	3.73	3.45	3.68	3.74	3.57	3.56	1.96	60.24
MH3	2.52	3.16	3.14	4.10	4.53	5.70	9.29	8.57	6.16	4.05	3.22	3.60	2.29	1.63	1.19	1.34	2.62	4.83	5.34	5.55	5.43	6.23	5.53	2.02	102.75
MH4	1.06	0.75	0.69	0.64	0.66	0.60	0.67	1.38	1.14	0.53	0.51	0.52	0.31	0.35	0.44	0.59	1.13	1.75	2.32	2.35	2.33	2.32	1.75	1.33	26.14
MH5	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

MONTHLY HOURLY AVERAGE
JANUARY 1982

TEA - HYPOTHETICAL ENERGY FROM UTILITY IF TEA WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MH1	2.43	1.89	1.54	1.58	2.02	2.74	3.41	4.81	4.13	3.60	2.60	2.26	2.01	1.56	1.73	1.79	2.73	3.82	3.14	2.19	2.35	2.70	3.08	3.22	63.49
MH2	1.60	1.47	1.45	1.42	2.29	2.84	3.31	3.84	3.13	1.66	1.18	0.82	0.80	1.83	2.04	1.64	2.63	3.46	2.92	3.26	3.58	3.23	2.94	1.71	54.82
MH3	1.42	2.07	2.22	3.11	3.69	4.69	9.78	10.30	5.67	3.50	3.07	3.37	2.21	1.25	0.78	1.13	2.71	4.17	6.45	5.59	4.76	5.43	4.90	2.16	84.43
MH4	0.88	0.78	0.67	0.64	0.64	0.59	0.68	1.39	1.12	0.59	0.43	0.52	0.27	0.29	0.34	0.61	0.99	1.50	2.12	2.13	2.05	2.10	1.61	1.27	24.32
MH5	1.50	0.86	0.83	1.06	1.07	1.66	2.41	6.28	3.23	1.70	0.99	0.59	0.27	0.15	0.07	0.35	0.22	1.14	2.68	2.19	1.88	1.99	2.33	2.37	37.82

MONTHLY HOURLY AVERAGE
JANUARY 1982

TSC - HYPOTHETICAL ENERGY FROM UTILITY IF TSC WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MH1	2.44	2.03	1.55	1.46	1.81	2.58	3.32	4.47	3.63	2.90	1.73	1.57	1.35	1.05	1.20	1.46	2.25	3.84	3.11	2.19	2.34	2.63	3.03	3.20	57.24
MH2	1.61	1.45	1.22	1.46	2.44	2.75	3.05	3.33	2.42	1.27	0.89	0.58	0.51	1.28	1.39	1.17	1.73	3.09	2.78	3.27	3.33	3.15	2.54	1.62	48.68
MH3	1.63	2.37	2.36	3.02	3.54	4.55	9.84	10.24	4.95	2.86	2.34	2.61	1.65	0.87	0.61	0.92	2.31	4.07	6.32	5.46	4.66	5.43	4.87	2.11	89.79
MH4	0.86	0.71	0.69	0.61	0.66	0.59	0.69	1.14	0.81	0.45	0.31	0.26	0.13	0.20	0.18	0.42	0.75	1.41	2.03	1.93	1.99	2.06	1.50	1.25	21.63
MH5	1.55	0.87	0.85	1.08	1.23	1.66	2.80	5.88	3.91	1.07	0.50	0.27	0.08	0.07	0.00	0.35	0.23	1.09	2.61	2.09	1.76	2.01	2.23	2.30	36.19

MONTHLY HOURLY AVERAGE
JANUARY 1982

*ST - HYPOTHETICAL ENERGY FROM UTILITY IF *ST WERE INSTALLED AT EACH MH (KWH)
ENERGY FOR EACH HOUR ENDING AT LOCAL STANDARD TIME

HOUR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTAL
MH1	2.53	2.37	1.87	1.82	2.67	3.42	4.01	5.19	4.70	3.66	2.58	2.31	1.86	1.49	1.73	1.63	3.35	4.02	3.06	2.29	2.33	2.75	3.44	3.24	65.43
MH2	1.66	1.61	1.47	1.45	2.52	3.70	3.99	4.73	2.77	0.71	0.50	0.65	1.01	2.23	2.11	1.39	2.31	3.83	3.56	3.74	3.98	3.23	3.14	2.05	58.87
MH3	3.30	4.02	3.60	4.14	4.54	5.27	7.53	7.64	6.01	3.57	3.69	4.77	2.93	2.31	1.42	1.73	2.79	4.75	5.24	5.16	5.34	5.65	5.56	2.50	103.80
MH4	1.18	0.79	0.63	0.67	0.54	0.64	0.65	1.39	0.94	0.33	0.45	0.64	0.41	0.29	0.35	0.44	1.01	1.75	2.43	2.29	2.35	2.36	1.74	1.07	25.45
MH5	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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

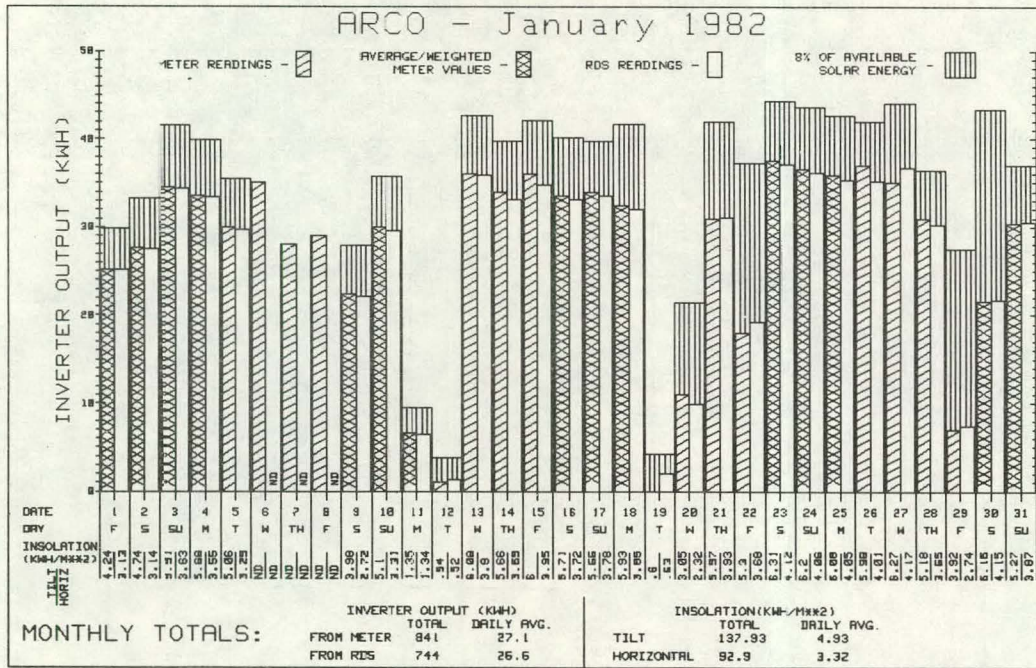
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SECTION 2

ENERGY HISTOGRAMS FOR JANUARY

Source of data is RDS and recording kilowatt hour meters. Comments on each histogram explain data and/or energy production anomalies.

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ARCO - January 1982

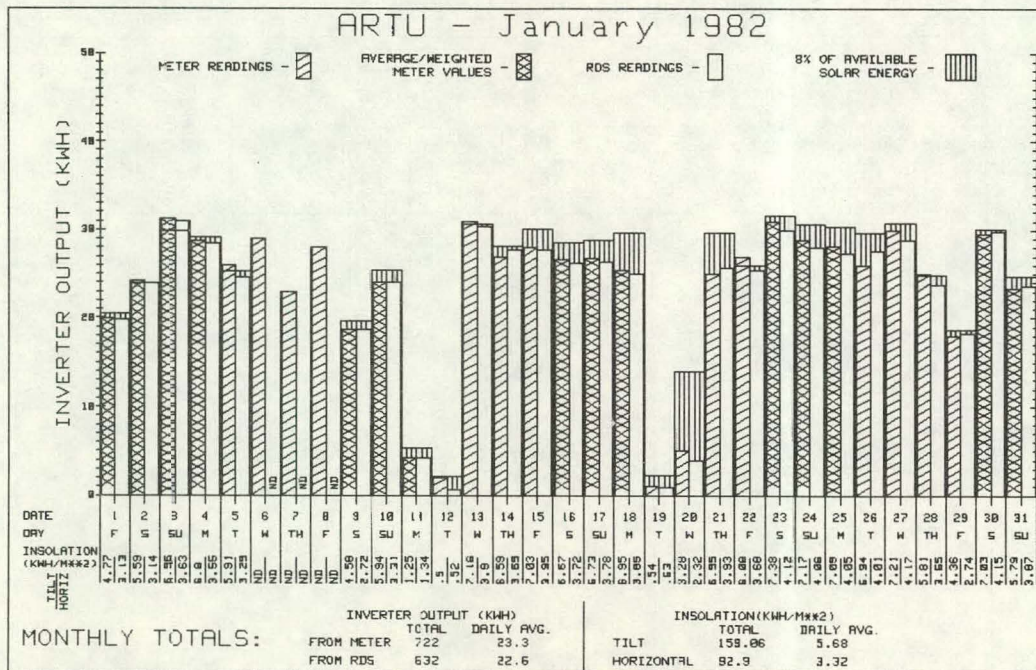
COMMENTS:

'ND' - NO RDS DATA

WHEN METER READINGS SPAN MORE THAN ONE DAY, VALUES ARE DETERMINED BY WEIGHTING WITH RDS DATA IF APPLICABLE OR BY AVERAGING. WHEN THE SYSTEM OUTPUT (METER AND/OR RDS VALUES) ARE EQUAL TO OR GREATER THAN THE VALUE CALCULATED FOR THE '% OF AVAILABLE SOLAR ENERGY' REFERENCE, THE LATTER VALUE IS REPRESENTED BY A SINGLE HORIZONTAL LINE IN THE COLUMN(S) IN WHICH IT IS THE LESSER VALUE.

DATE

- 1-6,7,8 NO RDS DATA DUE TO HP9845 PROBLEMS
- 1-20,21 I-V CURVES TAKEN.
- 1-22 INVERTER DOWN FROM 1210 TO 1330
- 1-29 CIRCUIT BREAKER TRIPPED AT 1129
- 1-30 INVERTER RESTARTED AT 1200



ARTU - January 1982

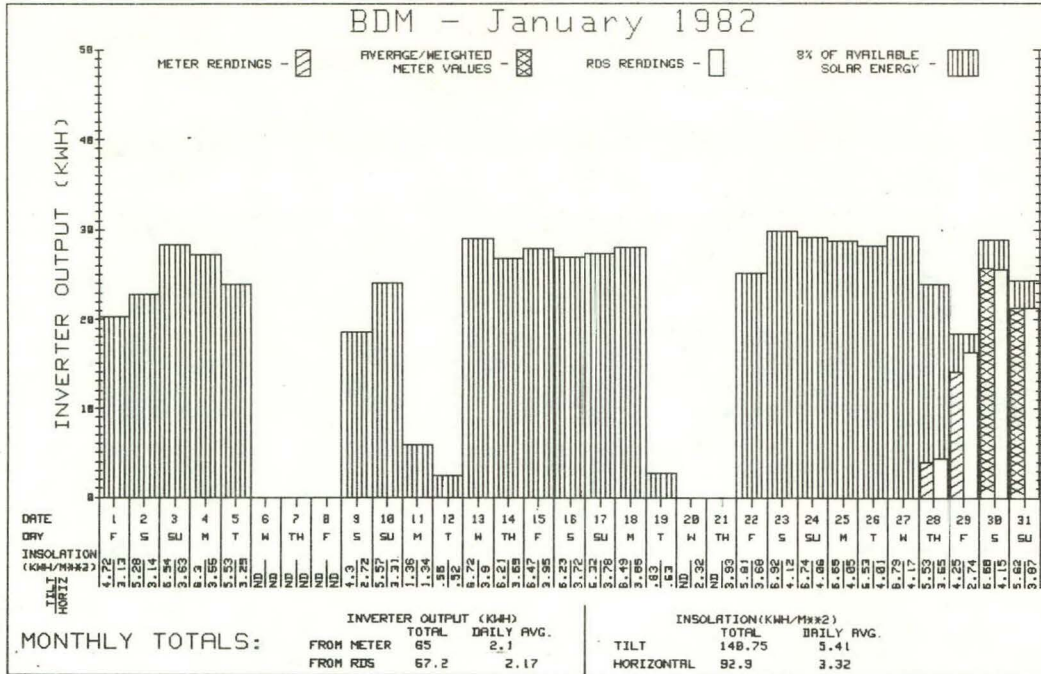
COMMENTS:

'ND' - NO RDS DATA

WHEN METER READINGS SPAN MORE THAN ONE DAY, VALUES ARE DETERMINED BY WEIGHTING WITH RDS DATA IF APPLICABLE OR BY AVERAGING. WHEN THE SYSTEM OUTPUT (METER AND/OR RDS VALUES) ARE EQUAL TO OR GREATER THAN THE VALUE CALCULATED FOR THE '% OF AVAILABLE SOLAR ENERGY' REFERENCE, THE LATTER VALUE IS REPRESENTED BY A SINGLE HORIZONTAL LINE IN THE COLUMN(S) IN WHICH IT IS THE LESSER VALUE.

DATE

- 1-6,7,8 NO RDS DATA DUE TO HP9845 PROBLEMS
- 1-20 INVERTER DOWN DUE TO BLOWN FUSE



BDM - January 1982

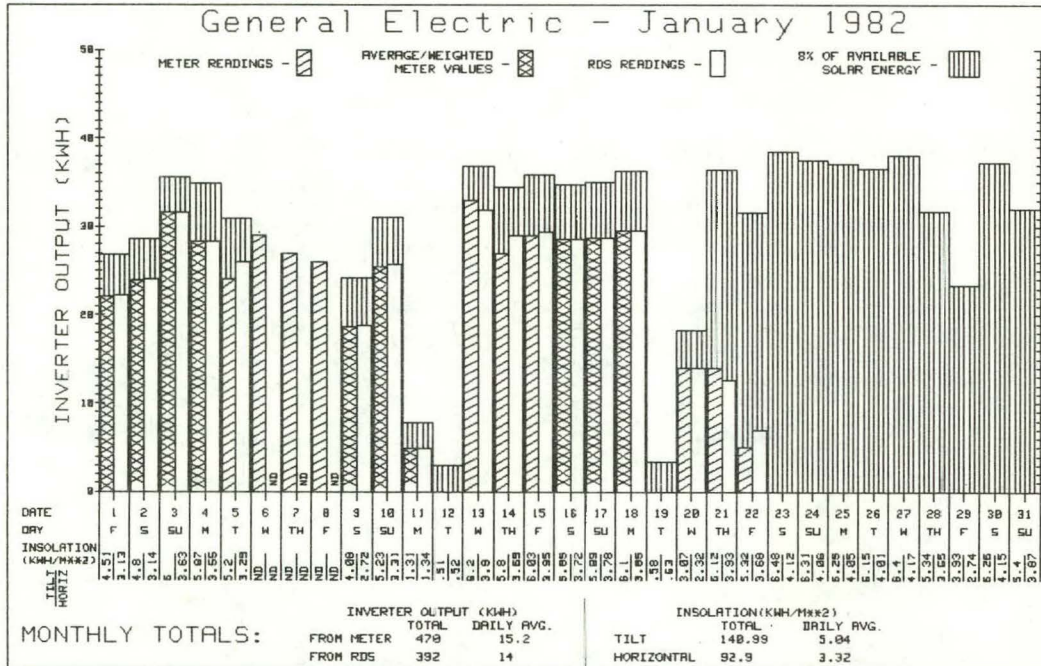
COMMENTS:

'NO'-NO RDS DATA

WHEN METER READINGS SPAN MORE THAN ONE DAY, VALUES ARE DETERMINED BY WEIGHTING WITH RDS DATA IF APPLICABLE OR BY AVERAGING. WHEN THE SYSTEM OUTPUT (METER AND/OR RDS VALUES) ARE EQUAL TO OR GREATER THAN THE VALUE CALCULATED FOR THE '% OF AVAILABLE SOLAR ENERGY' REFERENCE, THE LATTER VALUE IS REPRESENTED BY A SINGLE HORIZONTAL LINE IN THE COLUMN(S) IN WHICH IT IS THE LESSER VALUE.

DATE

- 1-6,7,8 NO RDS DATA DUE TO HP9845 PROBLEMS
- 1-20,21 PDAC OFFLINE
- 1-28 NEW DECC INVERTER ACTIVATED AT 1340



General Electric - January 1982

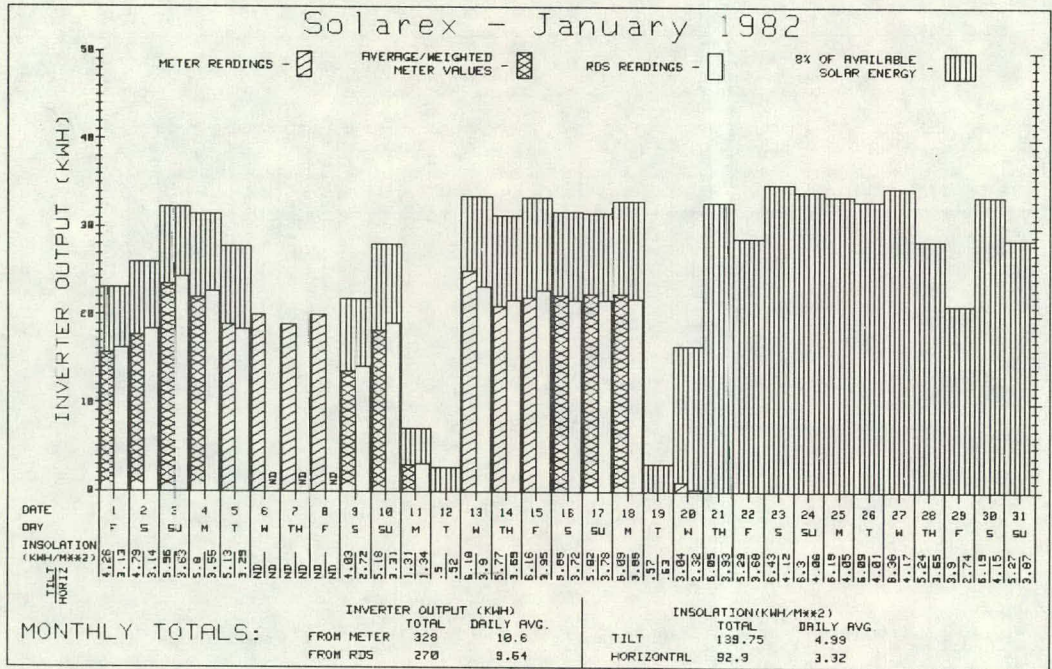
COMMENTS:

'NO'-NO RDS DATA

WHEN METER READINGS SPAN MORE THAN ONE DAY, VALUES ARE DETERMINED BY WEIGHTING WITH RDS DATA IF APPLICABLE OR BY AVERAGING. WHEN THE SYSTEM OUTPUT (METER AND/OR RDS VALUES) ARE EQUAL TO OR GREATER THAN THE VALUE CALCULATED FOR THE '% OF AVAILABLE SOLAR ENERGY' REFERENCE, THE LATTER VALUE IS REPRESENTED BY A SINGLE HORIZONTAL LINE IN THE COLUMN(S) IN WHICH IT IS THE LESSER VALUE.

DATE

- 1-6,7,8 NO RDS DATA DUE TO HP9845 PROBLEMS
- 1-22 INVERTER FAILED. FOUND OFFLINE AT 1220



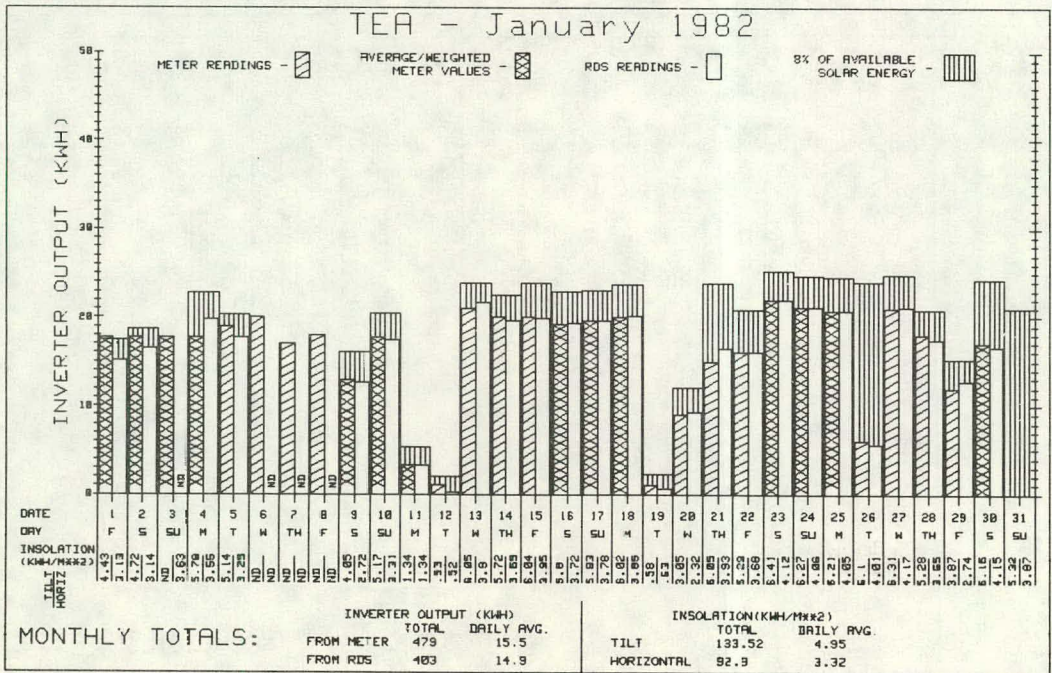
Solarex - January 1982

COMMENTS:

'ND'-NO RDS DATA

WHEN METER READINGS SPAN MORE THAN ONE DAY, VALUES ARE DETERMINED BY HEIGHTING WITH RDS DATA IF APPLICABLE OR BY AVERAGING. WHEN THE SYSTEM OUTPUT (METER AND/OR RDS VALUES) ARE EQUAL TO OR GREATER THAN THE VALUE CALCULATED FOR THE '% OF AVAILABLE SOLAR ENERGY' REFERENCE, THE LATTER VALUE IS REPRESENTED BY A SINGLE HORIZONTAL LINE IN THE COLUMN(S) IN WHICH IT IS THE LESSER VALUE.

DATE
 1-6,7,8 NO RDS DATA DUE TO HP9845 PROBLEMS
 1-20 INVERTER FAILED AROUND 1200 HRS.



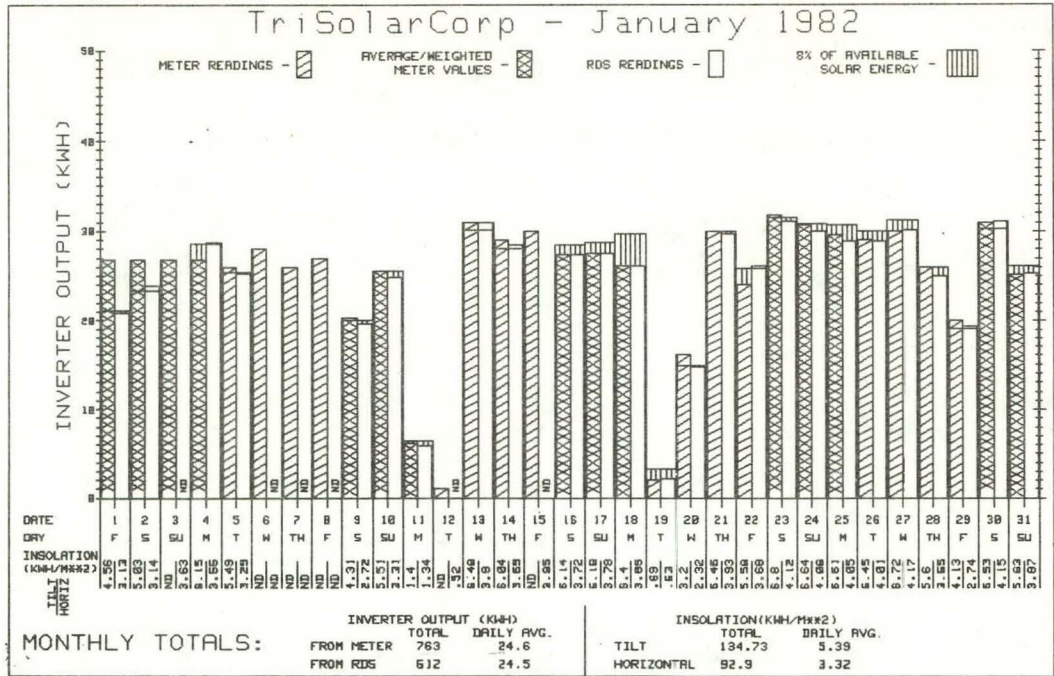
TEA - January 1982

COMMENTS:

'ND'-NO RDS DATA

WHEN METER READINGS SPAN MORE THAN ONE DAY, VALUES ARE DETERMINED BY HEIGHTING WITH RDS DATA IF APPLICABLE OR BY AVERAGING. WHEN THE SYSTEM OUTPUT (METER AND/OR RDS VALUES) ARE EQUAL TO OR GREATER THAN THE VALUE CALCULATED FOR THE '% OF AVAILABLE SOLAR ENERGY' REFERENCE, THE LATTER VALUE IS REPRESENTED BY A SINGLE HORIZONTAL LINE IN THE COLUMN(S) IN WHICH IT IS THE LESSER VALUE.

DATE
 1-3 DATA INVALID DUE TO RDS PROBLEMS
 1-6,7,8 NO RDS DATA DUE TO HP9845 PROBLEMS
 1-21 I-V CURVES TAKEN
 1-26 INVERTER DOWN 3-4 HOURS FOR REPAIRS
 1-30 INVERTER FAILED. FOUND OFFLINE AROUND 1550



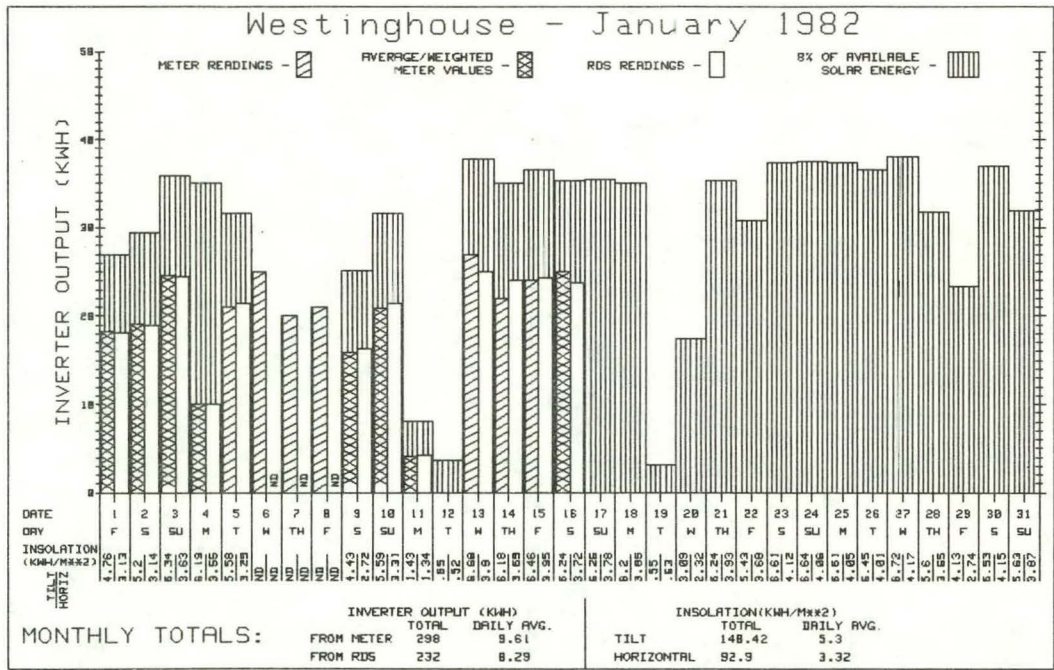
TriSolarCorp - January 1982

COMMENTS:

'ND'-NO RDS DATA

WHEN METER READINGS SPAN MORE THAN ONE DAY, VALUES ARE DETERMINED BY WEIGHTING WITH RDS DATA IF APPLICABLE OR BY AVERAGING. WHEN THE SYSTEM OUTPUT (METER AND/OR RDS VALUES) ARE EQUAL TO OR GREATER THAN THE VALUE CALCULATED FOR THE '% OF AVAILABLE SOLAR ENERGY' REFERENCE, THE LATTER VALUE IS REPRESENTED BY A SINGLE HORIZONTAL LINE IN THE COLUMN(S) IN WHICH IT IS THE LESSER VALUE.

DATE
 1-3,12,15 DATA INVALID DUE TO RDS PROBLEMS
 1-6,7,8 NO RDS DATA DUE TO HP9845 PROBLEMS



Westinghouse - January 1982

COMMENTS:

'ND'-NO RDS DATA

WHEN METER READINGS SPAN MORE THAN ONE DAY, VALUES ARE DETERMINED BY WEIGHTING WITH RDS DATA IF APPLICABLE OR BY AVERAGING. WHEN THE SYSTEM OUTPUT (METER AND/OR RDS VALUES) ARE EQUAL TO OR GREATER THAN THE VALUE CALCULATED FOR THE '% OF AVAILABLE SOLAR ENERGY' REFERENCE, THE LATTER VALUE IS REPRESENTED BY A SINGLE HORIZONTAL LINE IN THE COLUMN(S) IN WHICH IT IS THE LESSER VALUE.

DATE
 POOR MAXIMUM POWER TRACKER (MPT) OPERATION ALL MONTH
 1-4 NEW MPT INSTALLED
 1-6,7,8 NO RDS DATA DUE TO HP9845 PROBLEMS
 1-17 INVERTER FAILED AROUND 0900