

New England Solar Electric Inc

“Mail Order Pricing with Quality Service and Support.”

Since 1981



Issue 13 \$3

© 2013 New England Solar Electric Inc. All Rights Reserved.

Mon–Fri 9–5

Order Toll Free: (800) 914-4131

Fax: (413) 238-0203 Phone: (413) 238-5974

Email: [spschulze @ newenglandsolar.com](mailto:spschulze@newenglandsolar.com)

www.newenglandsolar.com

Index on Rear Cover

INTRODUCTION TO SOLAR ELECTRICITY

This catalog is designed to be used by the owner or potential owner of a PV system. Much of the product information has been selected and digested to specifically apply to the remote site home owner. After twenty years of research into the components and design of alternative energy systems, we've come to believe that not everyone should engage in the same cumbersome information-gathering process. We discuss all the components, including solar modules, batteries, inverters and even refrigerators, necessary for remote home use. Hopefully you will find it more valuable to read about the components you can use in your remote site home rather than the components available for all PV applications.



Our System Design Philosophy

The PV systems we have designed have sold themselves. The owners are happily committed to their alternative sources of energy. This catalog proposes several system designs. The logic behind this kit technology is that you will not make the same expensive mistakes others have. A wrong guess or a little misinformation can result in a wrong choice or a poor design. If you purchase the wrong piece of equipment you forever live with poor performance, or suffer the economic loss incurred in a trade-in. The solution is to profit from the previous mistakes of others.

Why Photovoltaics?

There are many reasons why a remote site home should be powered by photovoltaic electricity. For the majority of the people, the first reason to use PV is cost. If your home is \$20,000 from the power line, you are required to invest, or borrow and then invest, the full amount up front. You are responsible for an extra \$1000 of cost to run a cable from the road to the house and install the service equipment. Then you have the privilege of purchasing power at the going rate, with guaranteed yearly increases.

PV electricity costs much more per kilowatt than the power from the power company. If you can decrease your usage by the same percentage increase in cost per kilowatt-hour with a home designed for efficiency, then you can save the large cost of a line extension to your remote home.

A PV system is modular. It can be purchased first as a begin-

ning system and then expanded to a medium or large system. If you cannot afford a large PV system immediately, buy a small system and add to it as your cash flow permits.

A PV system is superior to a wind system in the home application. There is less maintenance, and what there is does not require an owner to choose between climbing a tower in an ice storm or watching his or her investment go down the drain. The sun shines more frequently than the wind blows. Long periods of no power in a wind system require a large and expensive battery bank.

A PV system is a welcome replacement to a life with a generator. Generators are inefficient in cost per kilowatt because they must run constantly at full RPM even if only a light bulb or a TV is being powered. They are noisy and require a lot of maintenance. They are much more expensive than a PV system if length of life and periodic maintenance are realistically considered. If a generator is needed, it should be used in conjunction with a PV system to create a PV/GEN hybrid. This increases the generator's efficiency while at the same time decreasing its running time and thus extending the generator's life.

A remote home is usually sited where it is because the owner wants privacy. Any owner who pays the price for power from the grid will automatically get some neighbors in the process. On the other hand, a person can purchase a piece of land inaccessible to power, have his or her privacy, and pay less because it is not attractive to the majority of people who feel that grid power is a necessity. The money saved buying lower priced land can be used to pay for a large PV system. For the complete recluse, there will be no monthly visit from the meterman.

Some people should not own a PV system. These are the people who expect that it will magically get installed, will never need to be monitored, and will supply enough electricity under all conditions as the power company does. With the power company, you just pay more when the relatives come for a week and leave all the lights on. With a PV system you will conserve or start the backup generator. There are, of course, very large installed, turnkey systems for those with the economic means.

More and more we are selling PV systems to people in the Northeast who are building a new home that is well within reach of the power line. These people are ignoring the economic reality that a PV system will produce electricity that will cost them two times per kilowatt what the power company charges. They



INTRODUCTION TO SOLAR ELECTRICITY

just plain want to do everything independently of the system.

Owning and installing a PV system is a significant commitment. You will need to understand its use just as you had to learn to drive a car. You will also need to troubleshoot the basics of the system to be able to call your dealer or the manufacturer.

We hope you will view your PV home as a model for PV homes to follow and therefore spend a little extra time and a little extra money to do the best job possible. We hope you will bring your system up to the standards of the National Electrical Code® (or NEC®), have it inspected by the local electrical inspector, show it to everyone you meet, and spread the word that there is a new, better, and independent way for us to produce our home electricity.

How A PV System Works

The simple PV system contains a PV module, a battery, and a load. (See Figure 1) The module transforms light energy to low voltage DC electricity that is stored in the battery until the electrical load is activated. The load uses the energy stored in the battery and the PV module then recharges the battery. The PV module could directly power the load. A 50 watt PV panel could power a 50 watt light bulb, but only in the daytime, and only on a sunny day. The battery can power the load at a time when the PV module is not producing electricity. On a sunny day a 50 watt PV module produces 50 watt-hours per hour for six hours, or 300 watt-hours per day. In this case the module could recharge the battery after the battery has been depleted 300 watt-hours. A possible load might be three 50 watt bulbs run for two hours each.

A PV system does not run on a scheduled daily basis. The sun may shine for two days and produce 300 watt-hours and then not produce any electricity on a third cloudy day. The load can also be distributed unequally. No energy might be used for two days, then three days of charging might all be used on the third day. A PV system produces an average amount of electricity dependent



on the average amount of sunshine. When a PV module produces an average of 100 watt-hours per day for ten days, it stores 1000 watt-hours in the battery. In this same ten day period no more than 1000 watt-hours should be used to power the loads.

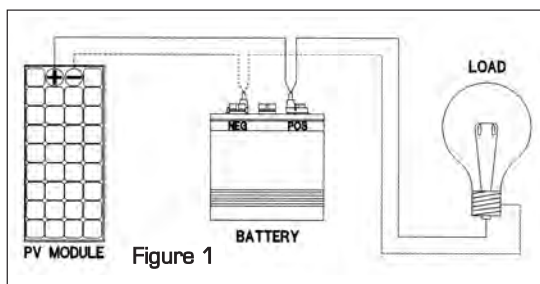
A remote home system consists of a PV array, a charge controller,

a battery bank, a DC fuse box, an inverter, and an AC fuse box. (See Figure 2.) Functionally, the PV array and charge controller together are no more than a simple battery charger that uses sunlight as its energy source.

The PV array produces electricity when the sun shines. The charge controller regulates the flow from the array to the battery bank. When the battery bank is low the charge controller feeds all of the electricity from the array to the batteries. As the batteries approach a state of full charge, the charge controller tapers the supply of electricity to prevent overcharging of the battery. At night it prevents a reverse flow of current from the batteries to the array. The battery bank stores the electricity as low voltage DC, normally at 12V, 24V or even 48V. The electricity is distributed through a DC fuse box to power low voltage DC appliances. The batteries supply electricity to a device called an inverter which changes the low voltage DC to 120V alternating current and then sends it to an AC circuit breaker box.

The charge controller and inverter are purchased in a specific voltage and a specific size based on the proposed performance. The PV modules are modular. A PV array may consist of one PV module at 12V, or 10 modules producing 10 times the current, but still at 12 volts. A small system can be enlarged by simply adding more modules. A battery bank may be enlarged by increasing the number of batteries but this is usually not recommended.

It is best to properly size the battery bank in the beginning for whatever size system one intends to end up with.



BOOKS

Backwoods Home Magazine

Reduced from \$19.95

Best of the First Two Years
480 pages 8.5 x 11 inches
019-008 \$4.99

The Fourth Year
384 pages 8.5 x 11 inches
019-011 \$4.99

The Fifth Year
384 pages 8.5 x 11 inches
019-013 \$4.99

The Sixth Year
384 pages 8.5 x 11 inches
019-014 \$4.99

The Seventh Year
384 pages 8.5 x 11 inches
019-015 \$4.99

The Eighth Year
384 pages 8.5 x 11 inches
019-016 \$4.99

The Tenth Year
384 pages 8.5 x 11 inches
019-018 \$4.99

The first is a very large book containing the best articles from the first two years of *Backwoods Home Magazine*. The articles cover all kinds of topics from remote homes and PV systems, building, recipes, beaver ponds, energy efficiency, gardening, electric cars, to nature. In short, if you live in rural America you will probably read this book from cover to cover. Now there are companion volumes which feature the best articles from the 4th through the 10th year of *Backwoods Home Magazine*.



Wiring Simplified

by H.P. Richter and W.C. Schwan
226 pages 6 x 9 inches
011-001 \$9.95

You intend to plan and/or install your home's electrical wiring. If you want the finished job to be practical, safe and receive a passing grade from the local electrical inspector as well, consider this book. The fact that *Wiring Simplified* is in its 43th edition is enough testimony to the value of this book. Richter and Schwan discuss the "how to aspects" of all kinds of wiring problems. Better yet, the reasons why things are done a certain way are explained. This is a readable, organized, well-illustrated, very popular textbook among electrician types.



Solar Hot Water Systems: 1977 to Today Lessons Learned

2004 Edition by Tom Lane
210 pages 8.5 x 11 inches
019-003 \$39.00

This book contains a thorough overview of the two major solar hot water heating systems: Drain Back and Glycol Antifreeze.

There is enough information in this book to keep you studying for weeks! The book has excellent diagrams for the two system types, including all parts needed, their description and operation. Advantages and disadvantages and an economic analysis of each system are also discussed.

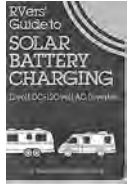
If you have any interest what-so-ever in solar hot water, buy this book.



RVers' Guide to Solar Battery Charging 12 volt DC - 120 volt AC Inverters

by Noel and Barbara Kirkby
164 pages 6 x 9 inches
012-002 \$12.95

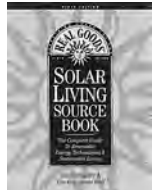
The Kirkbys have been RVers for over 20 years. They knew there had to be a better way to charge their RV's batteries than using those noisy, high maintenance generators. The answer was photovoltaics - electricity from the sun! A clear concise text on how to set up your RV's solar electric system. Covers all aspects of solar charging for RV's including solar panels, charge regulators, mounting hardware, batteries and wiring. This book also applies to cabins, boats and trailers. Includes many illustrations and photos as well as useful reference listings.



Alternative Energy Sourcebook by Real Goods

693 pages 8.5 X 11 inches
019-009 \$30.00

This is a monstrous book of all the products you could ever think of using in a home that is not connected to a powerline. There are pictures and detailed product information. Like each previous edition it is much better than the last.



the SOLAR ELECTRIC INDEPENDENT HOME BOOK

the SOLAR ELECTRIC INDEPENDENT HOME book



by New England Solar Electric Inc.

by **New England Solar Electric, Inc.**

010-001 REDUCED PRICE \$10.95

200 8.5" x 11" pages

75 CAD diagrams

25 Photographs

Perfect bound paperback

the SOLAR ELECTRIC INDEPENDENT HOME book is a worthwhile investment for a PV homeowner or potential PV homeowner. Our book discusses how to "site" and "size" a PV system for maximum efficiency and to meet a user's needs, weather conditions, and geographic location. Photovoltaic product information is included; comments are offered regarding comparative prices, warranties, and performance. Emphasis is placed on making efficient use of power. *The Solar Electric Independent Home Book* explains why solar electricity is a logical choice in remote areas and considers the ecological benefits of such a choice.

CHAPTERS INCLUDE:

Introduction to Solar Electricity
Living with a PV system
System Sizing
Appliance Efficiency
Modules and Charge Controllers
Batteries and Inverters
Installation Guidelines
Maintenance
Understanding Electricity

"This is a good one. Easy to read, and easy to understand, this book covers the basics in PV installation and use. New England Solar Electric Inc. has designed the book to be used by the owner or potential owner of a PV system. It is specifically geared for the remote home site."

Backwoods Solar Electric Systems,
Sandpoint, ID

The PV Home Series Booklets

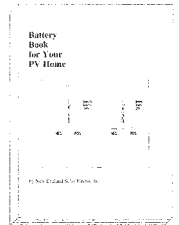
These booklets average 25 pages that are 8.5" by 11". The subjects are covered in much greater detail than in *the SOLAR ELECTRIC INDEPENDENT HOME book*. They are filled with detailed CAD diagrams and detailed instructions.

Please note: Booklets can be used to fulfill the 3 book order requirement for the 10% discount on the NEW BOOKS pages. Our most common order is for *the Solar Electric Independent Home Book* and the two booklets described on this page. The total for the three books is \$26.95. After your 10% discount for three books you pay only \$24.26 and we'll pay the shipping.

Battery Book for Your PV Home

010-002 \$8.00

This is a good investment for anyone with a lead-acid battery bank. After reading this book, you will understand the internal workings of a battery bank. You will learn how to maintain your batteries, equalize your batteries' cells, and rejuvenate batteries in the case that they have been misused.



PV/Generator Hybrid System for Your PV Home

010-003 \$8.00

You receive detailed instructions on wiring your generator to an inverter/charger and using this setup to increase the efficiency of your PV system. Specific generator recommendations are made. Lightning protection is discussed.



SOLAR ELECTRIC SYSTEM KITS

We ship most solar kits within a week. We will match or beat most any sale price on any PV modules, Trojan batteries, and any other products we sell.

"Mail order pricing with the courtesy of a family owned New England business."

Photovoltaic systems naturally fit into the format of kits because they are modular. Once a price range is determined, a balance of components can quickly be chosen. It is helpful to estimate an average daily load requirement (kWhrs per day) in order to facilitate a system design. However, many users do not begin with an accurate value for load and then purchase a system to supply that load. Instead they begin with an affordable price range and need to know what they can power for their money.

New England Solar Electric Inc. can make a system of any price or size and then put it into kit form to facilitate easy owner installation. At your option we can prewire AC/DC disconnect equipment for generator, inverter and charge controller. Then all you or your electrician would need to do is mount and wire the array outside, and wire the array downlead to the pre-wired disconnect. Assemble the battery bank, hook up the the generator input, AC output and inverter to the pre-wired AC/DC disconnect and you're all powered up!

The following seven kits cover the full spectrum of sizes for most remote homes. Each kit is available in a basic model, an intermediate model, and an advanced model. You may chose which one meets your individual needs. The more expensive kits include more optional components, larger and more sophisticated inverters and more pre-wired controls while maintaining the same power production. You may mix and match any options from one level to the other. Tell us what you want or ask our advice as to what you need, and we will promptly give a price quotation.

The following kits include SunWize 110 watt solar modules, Power-Up 185W solar panels or Trina 240W solar panels and Trojan T-105 batteries. We can custom design a kit with any components you may want. Call for more information and a quote.

Each listed kit or custom kit comes with complete directions and custom plans to be used by you or your electrician. We offer technical support before, during, and after the installation.

Each kit description on the following pages has the approximate output, for the Northeast, from the solar array, and the approximate amount of electricity that can later be used from the charged batteries. This is given for an average daily condition. Weekend use only, of a camp or cottage, will mean heavier daily loads for two days, but five days to bring the batteries back to full charge.

PV/Gen Hybrid

We can make a PV/Gen hybrid that combines the best use of a generator for large AC loads and battery charging for short intervals, and a photovoltaic system and inverter for all other loads. This generator back up with automatic transfer switching allows a PV system to be smaller (hence less expensive) and still meet load demands of no-sun periods. The PV/inverter part of the system extends generator life and eliminates continuous noise. All inverters included in our kits have an integral battery charger.

We strongly recommend a sine-wave inverter for home use. Modern sine-wave inverters will power any device normally found in the home, including efficient washing machines, refrigerators, heating systems and computer and entertainment equipment.



THE NORMAL SEQUENCE OF EVENTS

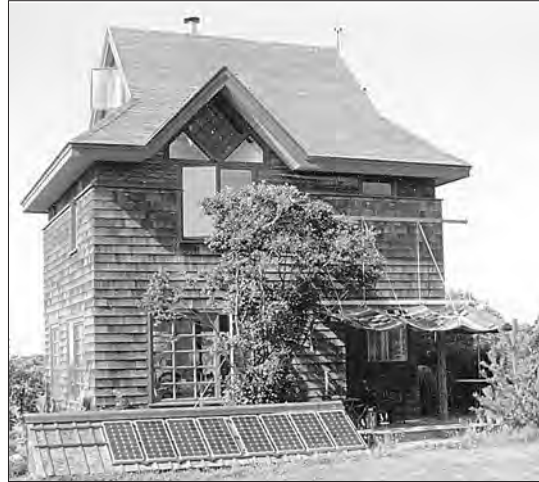
1. Receive and read our catalog.
2. Make an appointment for one or two hours of free consultation at NESE, or do the equivalent by telephone.
3. Purchase your kit.
4. Call us for technical support for you or your electrician.
5. Call us later for advice on system use, maintenance, or appliance recommendations if our book does not adequately answer your questions.

About our advice and support: We pride ourselves in giving the best support in the industry. If you are unsure as to how to proceed to design your solar electric system or if you just want to talk about the system you've already planned—we're the place to call. Our book explains almost every aspect of solar electricity for remote home use, but there's nothing like a straight forward discussion directed towards your particular needs. We will make sure you get the system that's right for you and we will make sure it is properly installed and maintained.

NOTE 1: Every installation is different. Kits do not include the array wiring between the solar array combiner box and battery bank. We can quote this if you give us the distance.

NOTE 2: Batteries and large solar modules (over 125 watts) in the following kits ship by freight, not UPS. The large Schneider (Xantrex) inverters also must ship by freight. Call for freight quote.

NOTE 3: The following kits feature SunWize 110W, Power-UP 185W solar modules or Trina 240W solar modules. We can substitute any other solar module in the catalog in any kit. Call for quote.



Consultation at New England Solar Electric Inc.

For those of you who would like to travel to Worthington, we offer two hours of free consultation, by appointment, at New England Solar Electric Inc. For additional time we charge a rate of \$35 per hour. We are open 9am to 5pm Mon thru Fri for consultation and sales.

The complete descriptions of all the equipment featured in our kits can be found on the catalog pages following the kit listings.

SOLAR ELECTRIC KITS

KIT #1

12V DC 110 Peak Watt Array

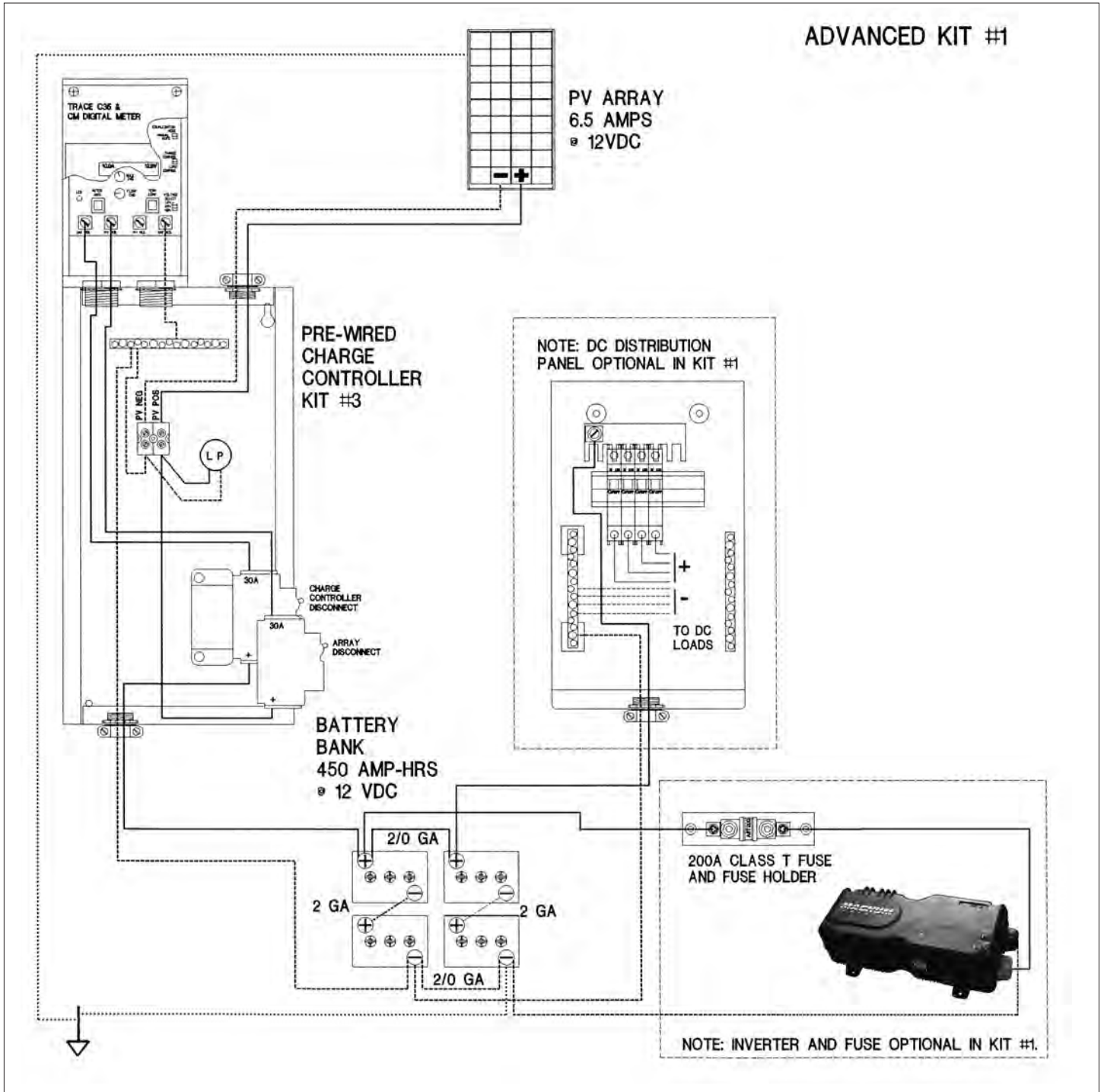
Average Array Output for Northeast:

Summer	550 watt-hr/day
Winter	225 watt-hr/day

Average Usable Energy from Batteries for NE:

Summer	468 watt-hr/day
Winter	232 watt-hr/day

This system will power 12V lights, TV, and CD player for a year round cabin or small remote home. You will count your kilowatts in the winter and have enough in the summer.



BASIC KIT #1

1	SunWize 110W Solar Module	\$369.00
1	Charge Controller Kit #1 Trace C-35 Controller Trace CM for C35	199.00
2	Trojan T-105 batteries	318.00
1	2 Ga. Battery cable	9.00
4	Battery anticorrosion rings	1.60
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	904.60

780-011 Special Kit Price \$869.00



INTERMEDIATE KIT #1

1	SunWize 110W Solar Module	\$369.00
1	Charge Controller Kit #2 Trace C-35 Controller Trace CM for C35 Big Baby Box w/ Two Breakers	279.00
4	Trojan T-105 batteries	636.00
2	2 Ga. Battery cables	18.00
2	2/0 Ga. Battery cables	24.00
8	Battery anticorrosion rings	3.20
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	1337.20

780-012 Special Kit Price \$1279.00

ADVANCED KIT #1

1	SunWize 110W Solar Module	\$369.00
1	Prewired Control Panel Trace C-35 controller Trace CM Digital meter MidNite Mini DC Disconnect 30A Array DC Circuit Breaker 40A Charge Controller DC Breaker 10' 6 Ga. wire to batteries	459.00
4	Trojan T-105 batteries	636.00
2	2 Ga. Battery cables	18.00
2	2/0 Ga. Battery cables	24.00
8	Battery anticorrosion rings	3.20
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	1517.20

780-013 Special Kit Price \$1459.00

OPTIONS

1	Magnum MM1512 Inverter w/70A Bat Charger	719.20
1	Class "T" Fuse Block and Fuse 200A	69.00
1	Set 10' 2/0 Inverter Cables	139.00
1	Two module adjustable frame	119.00
1	3 Position Array Combiner Box	99.00
1	10A Array Circuit Breaker	15.00
1	#12/2 Tray Cable (per foot)	0.69
1	Watertite connector	3.00
1	Prewired DC distribution panels: 6 Circuit 249.00 4 Circuit 219.00	
1	Solar Independent Home Book	10.95
1	Hydrometer	12.95
1	Digital Multimeter	25.00
1	Tri-Met System Monitor	169.00

NOTES:

1.This kit uses a 35 amp charge controller that allows the expansion of the array up to four 110W modules in a 12V system and eight 110W modules in a 24V system.

2.The Basic Kit#1 has no fuse or DC disconnect for the array or charge controller.

3.Array wiring and mounting are not included in any of the Kit#1's. See the "Options" section for possibilities.

SOLAR ELECTRIC KITS

KIT #2

12V DC 220 Peak Watt Array

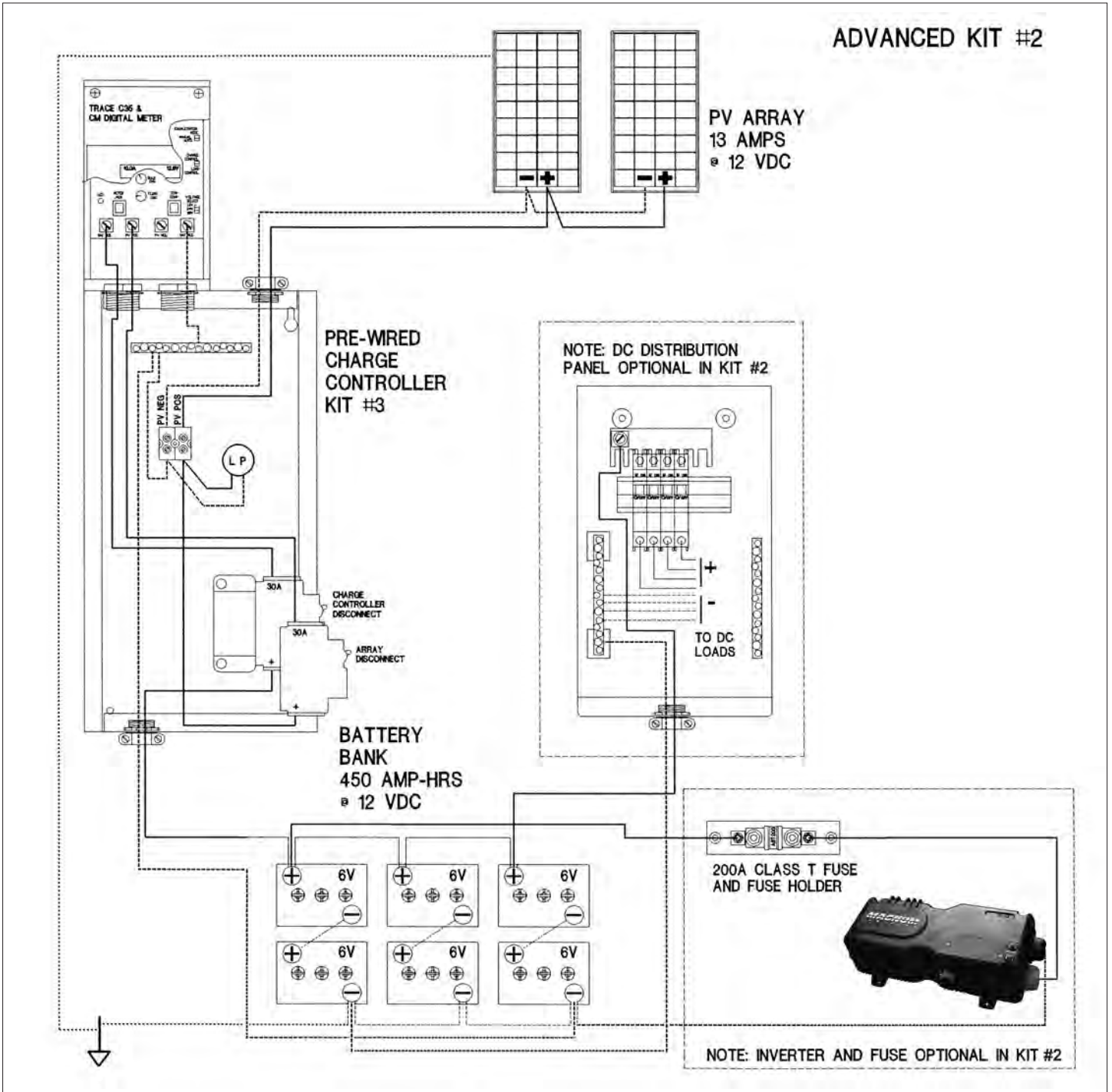
Average Array Output for Northeast:

Summer	1100 watt-hr/day
Winter	550 watt-hr/day

Average Usable Energy from Batteries for NE:

Summer	935 watt-hr/day
Winter	468 watt-hr/day

This is a good size system to run a DC remote home for a family that conserves and is used to living without electricity. With any small system, efficient 12V DC fluorescents keep demand low for winter months. This is also a good choice for a remote camp or cabin that is used a lot for summer vacationing. The addition of an inverter will allow you to 'camp' in luxury! (See Kit #3)



BASIC KIT #2

2	SunWize 110W Solar Modules	\$738.00
1	Charge Controller Kit #1 Trace C-35 Controller Trace CM for C35	199.00
4	Trojan T-105 batteries	636.00
2	2 Ga. Battery cables	18.00
2	2/0 Ga. Battery cables	24.00
8	Battery anticorrosion rings	3.20
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	1626.20

780-021 Special Kit Price \$1549.00



INTERMEDIATE KIT #2

2	SunWize 110W Solar Modules	\$738.00
1	3-Position Array Combiner Box	99.00
2	10A PV Circuit Breakers	30.00
2	Watertight Connectors	6.00
20'	#12/2 Tray Cable	13.80
1	Charge Controller Kit #2 Trace C-35 Controller Trace CM for C35 Big Baby Box w/ Two Breakers	279.00
6	Trojan T-105 batteries	954.00
3	2 Ga. Battery cables	27.00
4	2/0 Ga. Battery cables	48.00
12	Battery anticorrosion rings	4.80
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	2207.60

780-022 Special Kit Price \$2099.00

ADVANCED KIT #2

2	SunWize 110W Solar Modules	\$738.00
1	3-Position Array Combiner Box	99.00
2	10A PV Circuit Breakers	30.00
2	Watertight Connectors	6.00
20'	#12/2 Tray Cable	13.80
1	Prewired Control Panel Trace C-35 controller Trace CM Digital meter MidNite Mini DC Disconnect 30A Array DC Circuit Breaker 40A Charge Controller DC Breaker 10' 6 Ga. wire to batteries	459.00
6	Trojan T-105 batteries	954.00
3	2 Ga. Battery cables	27.00
4	2/0 Ga. Battery cables	48.00
12	Battery anticorrosion rings	4.80
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	2387.80

780-023 Special Kit Price \$2279.00

OPTIONS

1	Magnum MM1512 Inverter w/70A Bat Charger	719.20
1	Class "T" Fuse Block and Fuse 200A	69.00
1	Set 10' 2/0 Inverter Cables	139.00
1	Magnum RD2212 Inverter w/110A Bat Charger	1167.20
1	Class "T" Fuse Block and Fuse 400A	83.00
1	Set 10' 4/0 Inverter Cables	219.00
1	Two module adjustable frame	119.00
1	3 Position Array Combiner Box	99.00
1	10A Array Circuit Breaker	15.00
1	#12/2 Tray Cable (per foot)	0.69
1	Watertite connector	3.00
1	Prewired DC distribution panels: 6 Circuit 249.00 4 Circuit 219.00	
1	Solar Independent Home Book	10.95
1	Hydrometer	12.95
1	Digital Multimeter	25.00
1	Tri-Met System Monitor	169.00

NOTES:

1. This kit uses a 35 amp charge controller that allows the expansion of the array up to four 110W modules in a 12V system and eight 110W modules in a 24V system.

2. The Basic Kit#1 has no fuse or DC disconnect for the array or charge controller.

3. Array wiring and mounting are not included in any of the Kit#1's. See the "Options" section for possibilities.

SOLAR ELECTRIC KITS

KIT #3

12V DC 220 Peak Watt Array

Average Array Output for Northeast:

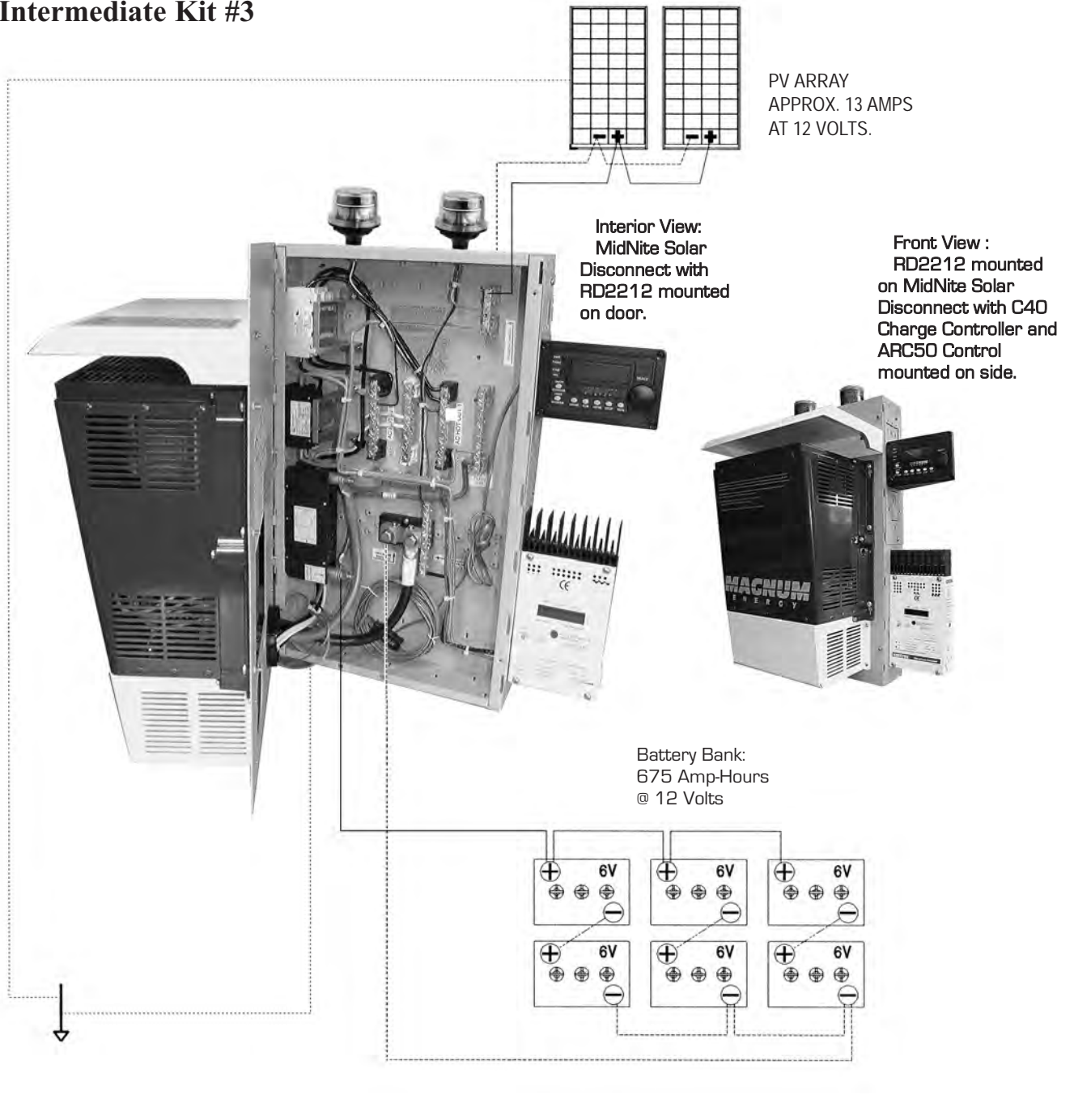
Summer	1100 watt-hr/day
Winter	550 watt-hr/day

Average Usable Energy from Batteries for NE:

Summer	935 watt-hr/day
Winter	468 watt-hr/day

This system supplies the same power as Kit #2. The addition of a medium sized inverter allows you to power almost all normal home appliances such as a vacuum, microwave, skill saw, and of course a TV and computer. This is a good beginning kit for a small home or an excellent kit for a summer (or winter for that matter) camp or cabin.

Intermediate Kit #3



BASIC KIT #3

2	SunWize 110W Modules	\$738.00
1	3-Position Array Combiner Box	99.00
2	10A PV Circuit Breakers	30.00
2	Watertight Connectors	6.00
20'	#12/2 Tray Cable	13.80
1	Charge Controller Kit #1 Trace C-35 controller Trace DVM for C35	199.00
6	Trojan T-105 batteries	954.00
3	2 Ga. Battery cables	27.00
4	2/0 Ga. Battery cables	48.00
12	Battery anticorrosion rings	4.80
1	Magnum MM1512AE 1500w Inverter	899.00
1	Magnum ME-ARC50 Inverter Control	299.00
1	Set 10' 2/0 Ga. inverter cables	139.00
1	Class "T" Fuse Block and Fuse 200A	69.00
1	302R Lightning Arrestor	39.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	3793.60

780-031 Special Kit Price \$3479.00

INTERMEDIATE KIT #3

2	SunWize 110W Modules	\$738.00
1	3-Position Array Combiner Box	99.00
2	10A PV Circuit Breakers	30.00
2	Watertight Connectors	6.00
20'	#12/2 Tray Cable	13.80
1	Prewired Control Panel Trace C-35 controller Trace CM Digital meter MidNite Mini DC Disconnect 30A Array DC Circuit Breaker 40A Charge Controller DC Breaker 10' 6 Ga. wire to batteries	459.00
6	Trojan T-105 batteries	954.00
3	2 Ga. Battery cables	27.00
4	2/0 Ga. Battery cables	48.00
12	Battery anticorrosion rings	4.80
1	Magnum RD2212 2200W Inverter	1459.00
1	Magnum ME-ARC50 Inverter Control	299.00
1	Set 10' 4/0 Ga. inverter cables	219.00
1	Class "T" Fuse Block and Fuse 200A	83.00
1	MidNite Lightning Arrestor	119.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	4566.60

780-032 Special Kit Price \$4129.00

ADVANCED KIT #3

2	SunWize 110W Modules	\$738.00
1	3-Position Array Combiner Box	99.00
2	10A PV Circuit Breakers	30.00
2	Watertight Connectors	6.00
20'	#12/2 Tray Cable	13.80
	<u>Prewired Control Panel:</u>	
1	MidNite Solar DC/AC Disconnect	619.00
1	Xantrex C40 Charge Controller	159.00
1	Xantrex CM Digital Meter	99.00
1	MidNite PV Ground Fault Breaker	69.00
2	Array & CC Disconnects 40A	30.00
2	MidNite Lightning Arrestors	238.00
8	Trojan T-105 batteries	1792.00
4	2 Ga. Battery cables R/B	36.00
6	2/0 Ga. Battery cables 3R & 3B	72.00
16	Battery anticorrosion rings	6.40
1	Magnum MS2012 2000W Inverter	2149.00
1	Magnum ME-ARC50 Inverter Control	299.00
1	Set 10' 2/0 Ga. inverter cables	219.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	6162.20

780-033 Special Kit Price \$5519.00



OPTIONS

1	Two module adjustable frame	119.00
1	Prewired DC distribution panels: 6 Circuit 249.00 4 Circuit 219.00	
1	Solar Independent Home Book	10.95
1	Hydrometer	12.95
1	Digital Multimeter	25.00
1	Tri-Met System Monitor	169.00

Advanced Kit #3 is available in 24V with a 24VDC Sine Wave inverter for \$5359.00. It is less expensive because both the inverter and cabling are less expensive.

SOLAR ELECTRIC KITS

KIT #4

24V DC 740 PEAK WATTS

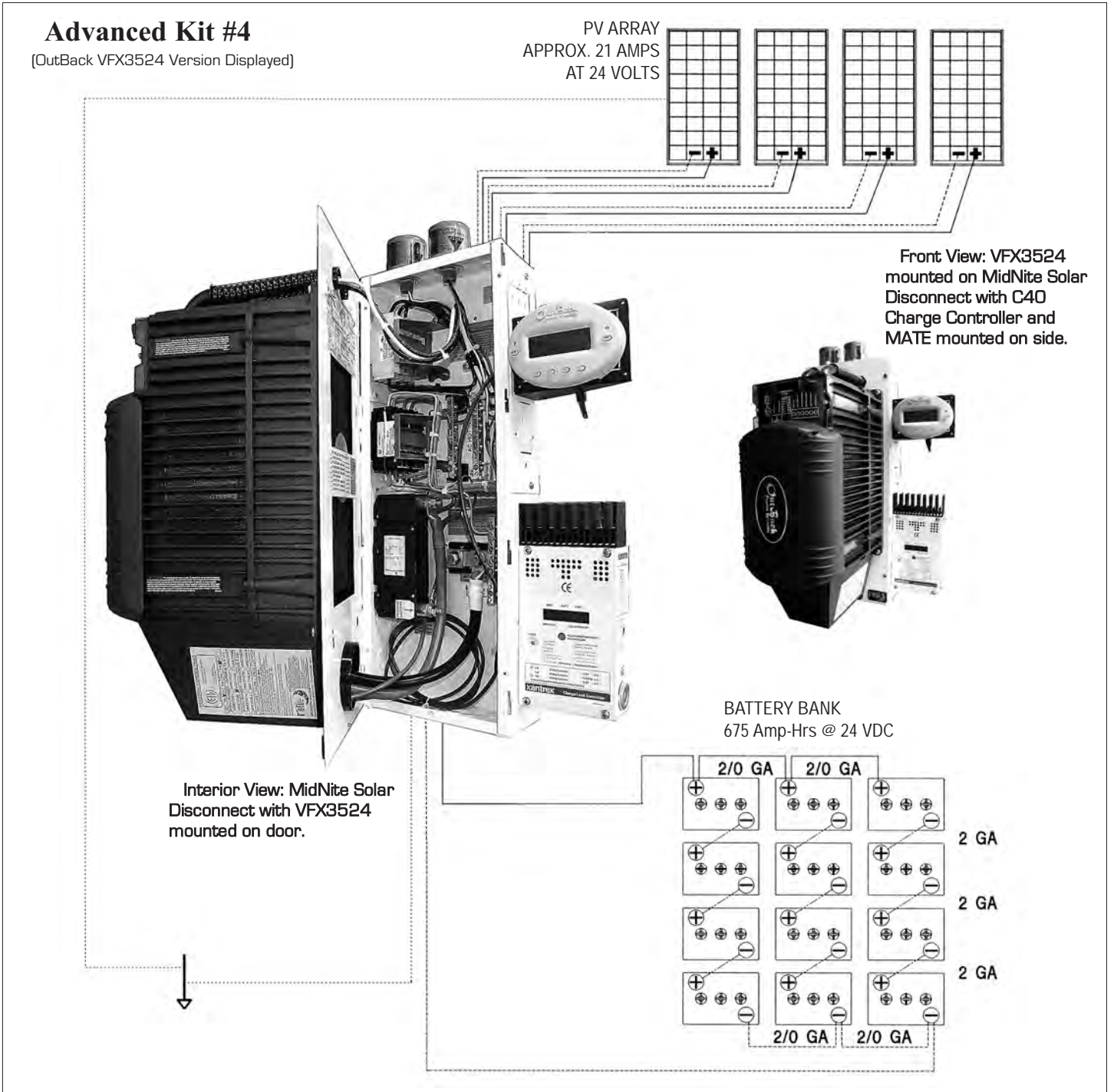
Average Array Output for Northeast:

Summer	3700 watt-hr/day
Winter	1850 watt-hr/day

Average Usable Energy from Batteries for NE:

Summer	3145 watt-hr/day
Winter	1572 watt-hr/day

This system will power needs of a small remote home. The large inverter will allow large AC loads such as a table saw, deep well pump, or washing machine. Without a generator back-up, loads must be monitored, especially in the winter months.



BASIC KIT #4

4	Power-Up 185W Modules	\$1076.00
1	6-Position Array Combiner Box	119.00
4	10A PV Circuit Breakers	60.00
4	Watertight Connectors	12.00
4	Pairs MC4 Array Cables	156.00
1	Prewired Control Panel	459.00
	Trace C-35 controller	
	Trace CM Digital meter	
	MidNite Mini DC Disconnect	
	30A Array DC Circuit Breaker	
	40A Charge Controller DC Breaker	
	10' 6 Ga. wire to batteries	
12	Trojan T-105 batteries	1908.00
9	2 Ga. Battery cables	81.00
4	2/0 Ga. Battery cables	48.00
24	Battery anticorrosion rings	9.60
1	Magnum RD2824 2800W Inverter	1679.00
1	Magnum ME-ARC50 Inverter Control	299.00
1	Set 10' 2/0 Ga. Inverter cables	139.00
1	Class "T" Fuse Block and Fuse 200A	69.00
1	MidNite MESP300 Lightning Arrestor	119.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	6241.60

780-041 Special Kit Price \$5679.00

INTERMEDIATE KIT #4

4	Power-Up 185W Modules	\$1076.00
1	6-Position Array Combiner Box	119.00
4	10A PV Circuit Breakers	60.00
4	Watertight Connectors	12.00
4	Pairs MC4 Array Cables	156.00
	<u>Prewired AC/DC Disconnect Panel:</u>	
1	MidNite Solar DC/AC Disconnect	619.00
1	Xantrex C40 Charge Controller	159.00
1	Xantrex CM Digital Meter	99.00
1	MidNite PV Ground Fault Breaker	69.00
2	Charge Controller 40A Breakers	30.00
2	MidNite MESP300 Lightning Arrestor	238.00
12	Trojan T-105 batteries	1908.00
9	2 Ga. Battery cables	81.00
4	2/0 Ga. Battery cables	48.00
24	Battery anticorrosion rings	9.60
1	Magnum RD2824 2800W Inverter	1679.00
1	Magnum ME-ARC50 Inverter Control	299.00
1	Set 10' 2/0 Ga. Inverter cables	139.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	6808.60

780-042 Special Kit Price \$6199.00

ADVANCED KIT #4

4	Power-Up 185W Modules	\$1076.00
1	6-Position Array Combiner Box	119.00
4	10A PV Circuit Breakers	60.00
4	Watertight Connectors	12.00
4	Pairs MC4 Array Cables	156.00
	<u>Prewired Control Panel:</u>	
1	MidNite Solar DC/AC Disconnect	619.00
1	Xantrex C40 Charge Controller	159.00
1	Xantrex CM Digital Meter	99.00
1	MidNite PV Ground Fault Breaker	69.00
2	Charge Controller 40A Breakers	30.00
2	MidNite MESP300 Lightning Arrestor	238.00
12	Trojan T-105 batteries	1908.00
9	2 Ga. Battery cables R/B	81.00
4	2/0 Ga. Battery cables 2R & 2B	48.00
24	Battery anticorrosion rings	9.60
1	Magnum MS4024 4000W Inverter	2599.00
1	Magnum ME-ARC50 Inverter Control	299.00
1	Set 10' 4/0 Ga. inverter cables	219.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	7808.60

780-043 Special Kit Price \$7009.00

Note: Advanced Kit #4 Can feature an OutBack VFX3524 inverter and Mate, complete with the pre-wired AC/DC disconnect for \$6,979. Call for details.



OPTIONS

2	2 Module adjustable frame -Vert. align	400.00
1	Solar Electric Independent Home Book	10.95
1	Hydrometer	12.95
1	Digital Multimeter	25.00
1	Tri-Met System Monitor	169.00

SOLAR ELECTRIC KITS

KIT #5

24 V DC 960 Peak Watt Array

Average Array Output for Northeast:

Summer	4800 watt-hr/day
Winter	2400 watt-hr/day

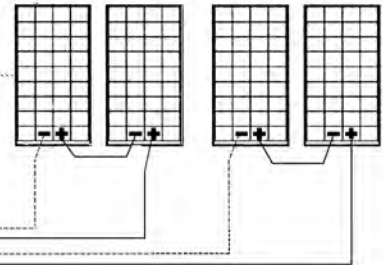
Average Usable Energy from Batteries for NE:

Summer	4080 watt-hr/day
Winter	2040 watt-hr/day

Many customers power a complete alternative energy household with this system. Conservation or alternative back up is employed in winter no-sun periods. All major heating or cooling loads, with the possible exception of a very efficient refrigerator (less than 1 kW-hr/day), must be powered by a fuel other than electricity. This system will easily power a Grundfos 1/2HP submersible water pump..

Advanced Kit #5

PV ARRAY APPROX.
30AMPS AT 24V into
Battery Bank

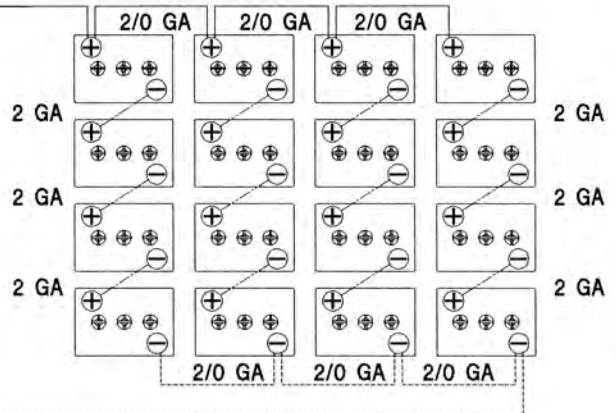


Interior View: MidNite Solar Disconnect with Magnum MS4024PAE mounted on door.

Front view: Magnum MS4024PAE mounted on MidNite Solar Disconnect with MidNite Classic 150 charge controller and ARC50 control mounted on side.



Battery Bank:
900 Amp-Hours at 24 VDC



BASIC KIT #5

4	Trina 240W Solar Modules	1116.00
2	MC Connector Cables	78.00
2	Watertight Connectors	6.00
1	MidNite 3-Pos Array Combiner Box	99.00
2	Outback 15A Array Circuit Breakers	30.00
<u>Prewired AC/DC Disconnect Panel:</u>		
1	MidNite Solar DC/AC Disconnect	619.00
1	MidNite Classic 150 Charge Controller	850.00
2	80A Breakers for Charge Cont & Array	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
16	Trojan T-105 Batteries	2544.00
12	2 Ga. Battery Cables (R/B)	108.00
6	2/O Ga. Battery Cables (3R/3B)	72.00
24	Battery anticorrosion rings	12.80
1	Magnum MS2024 2000w 24V Inverter	2099.00
1	Magnum ME-ARC50 Remote Control	299.00
1	Set 10' 2/O Ga. inverter cables	139.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	8367.80

780-051 Special Kit Price \$7499.00

INTERMEDIATE KIT #5

4	Trina 240W Solar Modules	1116.00
2	MC Connector Cables	78.00
2	Watertight Connectors	6.00
1	MidNite 3-Pos Array Combiner Box	99.00
2	Outback 15A Array Circuit Breakers	30.00
<u>Prewired AC/DC Disconnect Panel:</u>		
1	MidNite Solar DC/AC Disconnect	619.00
1	MidNite Classic 150 Charge Controller	850.00
2	80A Breakers for Charge Cont & Array	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
16	Trojan T-105 Batteries	2544.00
12	2 Ga. Battery Cables (R/B)	108.00
6	2/O Ga. Battery Cables (3R/3B)	72.00
24	Battery anticorrosion rings	12.80
1	Magnum MS4024 4000w 24V Inverter	2599.00
1	Magnum ME-ARC50 Remote Control	299.00
1	Set 10' 4/O Ga. inverter cables	219.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	8947.80

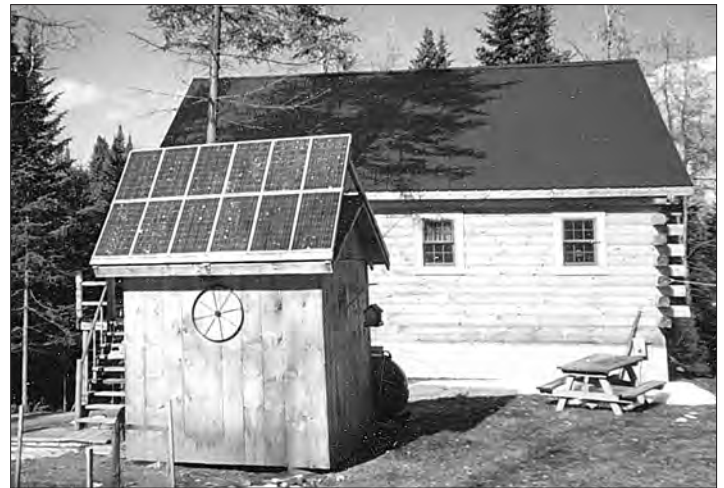
780-052 Special Kit Price \$7979.00

Note: Intermediate Kit #5 Can feature an OutBack VFX3524 inverter, complete with a pre-wired control panel for \$7,949.

ADVANCED KIT #5

4	Trina 240W Solar Modules	1116.00
2	MC Connector Cables	78.00
2	Watertight Connectors	6.00
1	MidNite 3-Pos Array Combiner Box	99.00
2	Outback 15A Array Circuit Breakers	30.00
<u>Prewired AC/DC Disconnect Panel:</u>		
1	MidNite Solar DC/AC Disconnect	799.00
1	MidNite Classic 150 Charge Controller	850.00
2	80A Breakers for Charge Cont & Array	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
16	Trojan T-105 Batteries	2544.00
12	2 Ga. Battery Cables (R/B)	108.00
6	2/O Ga. Battery Cables (3R/3B)	72.00
24	Battery anticorrosion rings	12.80
1	Magnum MS4024PAE Inverter	2699.00
1	Magnum ME-ARC50 Remote Control	299.00
1	Set 10' 4/O Ga. inverter cables	219.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	9227.80

780-053 Special Kit Price \$8239.00



OPTIONS

2	2 Module Adjustable Mounting Racks	400.00
1	Top-of-Pole Rack for 4 Solar Modules	990.40
1	4-Module Set of UniRac (non-adjustable)	350.00
1	Solar Electric Independent Home Book	10.95
1	Hydrometer	12.95
1	Digital Multimeter	25.00
1	Tri-Met System Monitor	169.00

Note: Advanced Kit #5 includes a Magnum MS4024PAE inverter. This 4000W 24VDC inverter outputs 120/240 volt AC power. This system would be used if you had a 230 VAC submersible well pump and/or a large generator with 240/120 VAC output.

Advanced Kit #5 could also feature a Magnum MS4448PAE 4400W inverter using a 48VDC battery bank for \$8129.

SOLAR ELECTRIC KITS

KIT #6

24 V DC 1440 Peak Watt Array

Average Array Output for Northeast:

Summer 7200 watt-hr/day
 Winter 3600 watt-hr/day

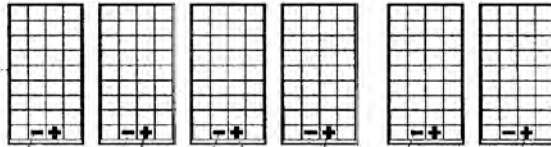
Average Usable Energy from Batteries for NE:

Summer 6120 watt-hr/day
 Winter 3060 watt-hr/day

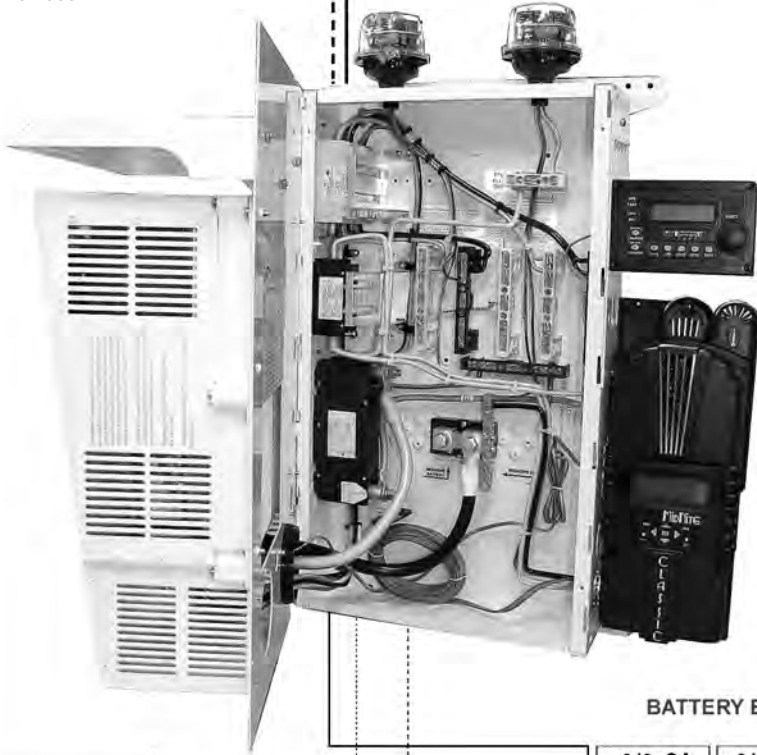
Kit #6 will power the entire home of a conservation-minded alternative energy user. A back up generator may not be needed, but is always useful during long periods of bad weather. The Schneider (Xantrex) XW4024, the Magnum MS4024PAE or the Magnum MS4024 inverter will power almost anything you need to run! The XW4024 and the Magnum MS4024PAE provide 120/240VAC power. The Magnum MS4024 or the substitute OutBack VFX3524 are 120VAC only.

INTERMEDIATE KIT #6

Interior View of MidNite Solar Disconnect with Magnum MS4024PAE Inverter Mounted on door.

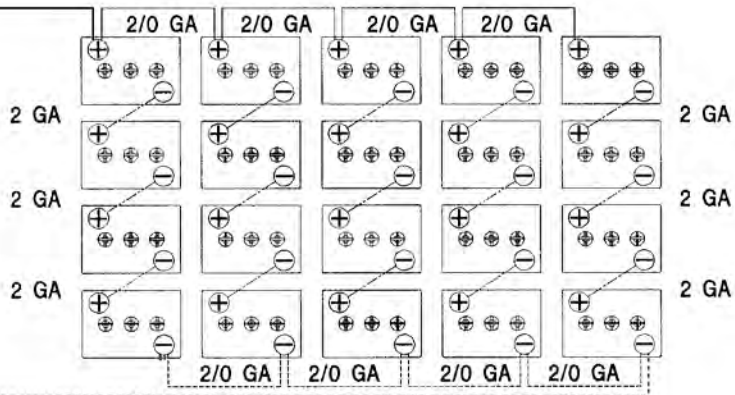


PV ARRAY:
 Six Trina 240W Solar Panels
 APPROX. 48 AMPS into a
 24V battery bank. (Note: Panels
 are wired in series-pairs and
 converted to 24V by the Classic
 150 charge controller)



Front View:
 Magnum MS4024PAE Inverter
 mounted on MidNite Solar
 Disconnect with a MidNite Classic
 150 Charge Controller and ME-
 ARC50 Control Panel mounted on
 the side.

BATTERY BANK 1125A-H @ 24 VDC



BASIC KIT #6

6	Trina 240W Solar Modules	1674.00
3	MC Connector Cables	117.00
3	Watertight Connectors	9.00
1	MidNite 6-Pos Array Combiner Box	119.00
3	Outback 15A Array Circuit Breakers	45.00
	<u>Prewired AC/DC Disconnect Panel:</u>	
1	MidNite Solar DC/AC Disconnect	619.00
1	MidNite Classic 150 Charge Controller	850.00
2	80A Breakers for Charge Cont & Array	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
20	Trojan T-105 Batteries	3180.00
15	2 Ga. Battery Cables (R/B)	135.00
8	2/O Ga. Battery Cables (3R/3B)	96.00
40	Battery anticorrosion rings	16.00
1	Magnum MS4024 4000w 24V Inverter	2599.00
1	Magnum ME-ARC50 Remote Control	299.00
1	Set 10' 4/O Ga. inverter cables	219.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	9239.20

780-061 Special Kit Price \$9239.00

INTERMEDIATE KIT #6

6	Trina 240W Solar Modules	1674.00
3	MC Connector Cables	117.00
3	Watertight Connectors	9.00
1	MidNite 6-Pos Array Combiner Box	119.00
3	Outback 15A Array Circuit Breakers	45.00
	<u>Prewired AC/DC Disconnect Panel:</u>	
1	MidNite Solar DC/AC Disconnect	799.00
1	MidNite Classic 150 Charge Controller	850.00
2	80A Breakers for Charge Cont & Array	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
20	Trojan T-105 Batteries	3180.00
15	2 Ga. Battery Cables (R/B)	135.00
8	2/O Ga. Battery Cables (3R/3B)	96.00
40	Battery anticorrosion rings	16.00
1	Magnum MS4024PAE 4000w Inverter	2699.00
1	Magnum ME-ARC50 Remote Control	299.00
1	Set 10' 4/O Ga. inverter cables	219.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	10,553.00

780-062 Special Kit Price \$9499.00

Note: Basic Kit #6 Can feature an OutBack VFX3524 inverter complete with a pre-wired control panel for \$9,189.

ADVANCED KIT #6

6	Trina 240W Solar Modules	1674.00
3	MC Connector Cables	117.00
3	Watertight Connectors	9.00
1	MidNite 6-Pos Array Combiner Box	119.00
3	Outback 15A Array Circuit Breakers	45.00
1	Xantrex XW 60 Charge Controller	685.00
2	Xantrex XW 60A Circuit Breakers	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
1	XW AC/DC Disconnect - Prewired	1800.00
1	Xantrex XW4024 120/240V Inverter	3950.00
1	XW Control Panel	300.00
1	Set 10' 4/O Ga. inverter cables	219.00
20	Trojan T-105 batteries	3180.00
15	2 Ga. Battery cables R/B	135.00
8	2/O Ga. Battery cables 4R & 4B	96.00
40	Battery anticorrosion rings	16.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	12,641.00

780-063 Special Kit Price \$11,189.00



OPTIONS

3	2 Module adjustable frames	600.00
1	Top-of-Pole Rack for 6 Solar Modules	1066.40
2	3-Module Sets of UniRac (non-adjustable)	500.00
1	XW Auto Generator Start Module	180.00
1	Solar Electric Independent Home Book	10.95
1	Hydrometer	12.95
1	Digital Multimeter	25.00
1	Tri-Met System Monitor	169.00

SOLAR ELECTRIC KITS

KIT #7

48 V DC 1920 PEAK WATTS

Average Array Output for Northeast:

Summer	9600 watt-hr/day
Winter	4800 watt-hr/day

Average Useable Energy from Batteries for NE:

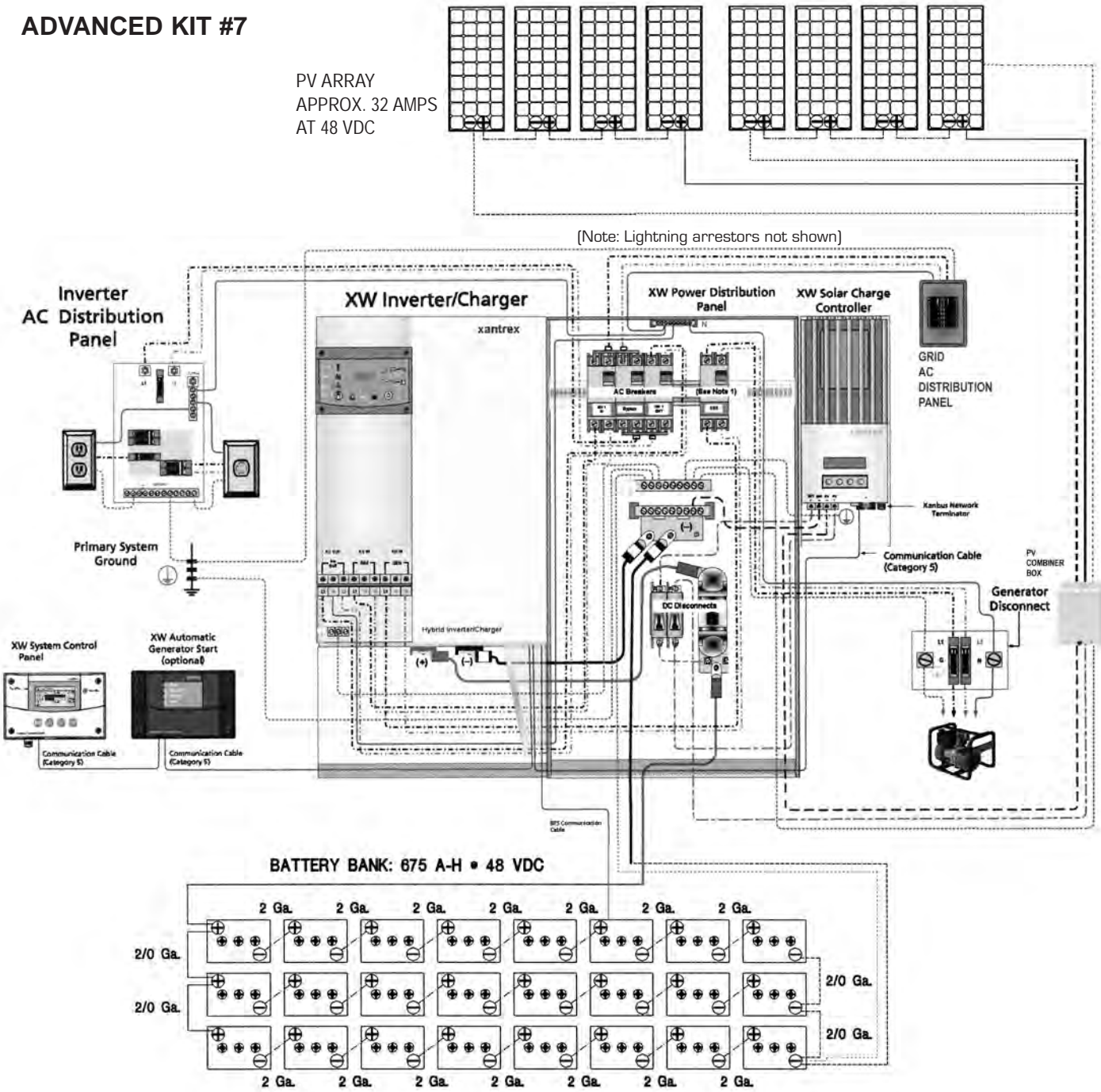
Summer	8160 watt-hr/day
Winter	4080 watt-hr/day

This deluxe kit features a large array and the Schneider (Xantrex) XW6048 6000 watt True Sine Wave Inverter which provides 120/240 volt power. This configuration can power an entire conventional home. Of course you're power consumption is still limited by the number of solar modules in your system. Because this is a 48 volt system, you can double the size of your array without adding another charge controller. Still not enough power for a "conventional" home in the northeast, but a real "Cadillac" of an alternative energy system!

ADVANCED KIT #7

PV ARRAY
APPROX. 32 AMPS
AT 48 VDC

(Note: Lightning arrestors not shown)



BASIC KIT #7

8	Trina 240W Solar Modules	2232.00
2	MC Connector Cables	78.00
2	Watertight Connectors	6.00
1	MidNite 6-Pos Array Combiner Box	119.00
2	Outback 15A Array Circuit Breakers	30.00
	<u>Prewired AC/DC Disconnect Panel:</u>	
1	MidNite Solar DC/AC Disconnect	799.00
1	MidNite Classic 150 Charge Controller	850.00
2	80A Breakers for Charge Cont & Array	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
24	Trojan T-105 batteries	3816.00
21	2 Ga. Battery cables R/B	189.00
4	2/0 Ga. Battery cables 2R & 2B	48.00
48	Battery anticorrosion rings	19.20
1	Magnum MS4448AE Inverter	2,699.00
1	Magnum ME-ARC50 remote Control	299.00
1	Set 10' 2/0 Ga. inverter cables	139.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	11,619.20

780-071 Special Kit Price \$10,509.00

INTERMEDIATE KIT #7

8	Trina 240W Solar Modules	2232.00
2	MC Connector Cables	78.00
2	Watertight Connectors	6.00
1	MidNite 6-Pos Array Combiner Box	119.00
2	Outback 15A Array Circuit Breakers	30.00
1	Xantrex XW 60 MPPT Charge Controller	685.00
2	Xantrex XW 60A Circuit Breakers	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
1	XW DC Disconnect - Prewired	1800.00
24	Trojan T-105 batteries	3816.00
21	2 Ga. Battery cables R/B	189.00
4	2/0 Ga. Battery cables 2R & 2B	48.00
48	Battery anticorrosion rings	19.20
1	Xantrex XW4548 120/240V Inverter	3950.00
1	Set 10' 4/0 Ga. inverter cables	219.00
1	XW Control Panel	300.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	13,787.20

780-072 Special Kit Price \$12,279.00

Kit #7 features the Magnum MS4448PAE, the Xantrex XW4548 or the Xantrex XW6048 120/240V inverter. We highly recommend a Sine Wave inverter for powering your home. The new Xantrex XW Series inverters not only feature 120/240 VAC output using only one inverter, but they also incorporate grid-tie capabilities. See the inverter section for more details on this fantastic new line of inverters.

ADVANCED KIT #7

8	Trina 240W Solar Modules	2232.00
2	MC Connector Cables	78.00
2	Watertight Connectors	6.00
1	MidNite 6-Pos Array Combiner Box	119.00
2	Outback 15A Array Circuit Breakers	30.00
1	Xantrex XW 60 MPPT Charge Controller	685.00
2	Xantrex XW 60A Circuit Breakers	50.00
2	MidNite MESP300 Lightning Arrestor	238.00
1	XW DC Disconnect - Prewired	1800.00
24	Trojan T-105 batteries	3816.00
21	2 Ga. Battery cables R/B	189.00
4	2/0 Ga. Battery cables 2R & 2B	48.00
48	Battery anticorrosion rings	19.20
1	Xantrex XW6048 120/240V Inverter	4650.00
1	Set 10' 4/0 Ga. inverter cables	219.00
1	XW Control Panel	300.00
1	Battery Book for Your PV Home	8.00
	Total Catalog Price	14,487.20

780-073 Special Kit Price \$12,839.00



OPTIONS

8	Trojan T-105 batteries	1,192.00
4	2 Module adjustable frames	800.00
1	Top-of-Pole Rack for 8 Solar Modules	1,316.80
2	4-Module Sets of UniRac (non-adjustable)	575.00
1	XW Auto Generator Start Module	180.00
1	Solar Electric Independent Home Book	10.95
1	Hydrometer	12.95
1	Digital Multimeter	25.00
1	Tri-Met System Monitor	169.00

GENERATOR/INVERTER/CHARGER KITS

Generator/Inverter/Charge System

For those of you who don't want to get into solar yet, we can create a Generator/ Inverter/ Charger system that allows the use of a generator for large AC loads while charging a battery bank (at the same time) in order to use the inverter for power smaller, longer running loads. The Inverter/charger part of the system extends generator life and eliminates continuous noise. Later, solar can easily be added in order to run the generator even less.

Conventional Home Backup

The Generator/Inverter/Charger Kit also makes an excellent backup power source for homes powered by the power company. The same benefits apply as use in a remote home: much more efficient use of the backup generator. Our web site, newenglandsolar.com, has an extended article explaining how to incorporate this type of system into a conventional home.

For those places where there is no solar exposure, or for those people who wish to first efficiently utilize their generator before they take the chance on PV, we can provide you with a generator/inverter/charger kit.

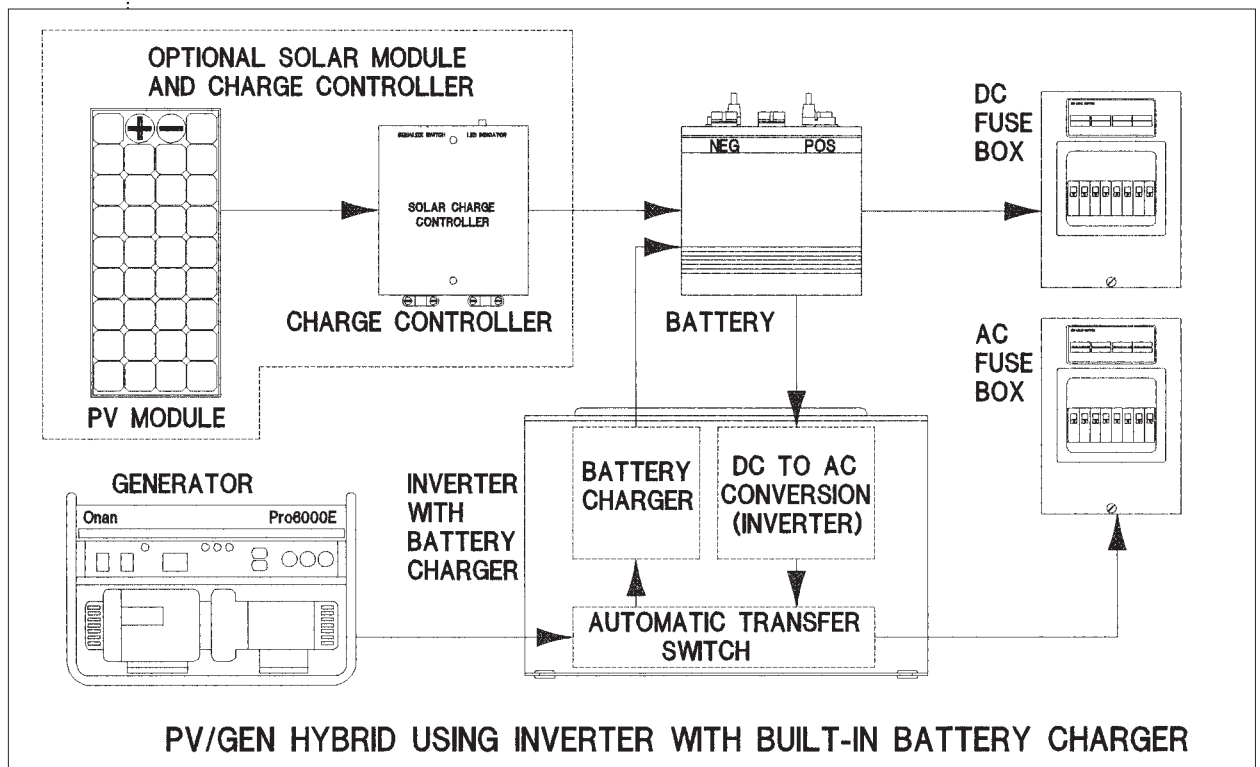
A generator/inverter/charger kit consists of a battery bank, and an inverter with an integral battery charger and automatic transfer switch. When the generator is on, the inverter senses it and connects all loads directly to the generator. The inverter also changes functions and operates backwards as a battery charger. When the generator is turned off, all loads are powered by the inverter using the stored electricity in the batteries. When the batteries are low the generator must be used to recharge the batteries. The obvious advantage to this system is that the generator runs less, making less noise, lasting longer, and using less fuel.

The following is an example of how one might use a Generator/Inverter/Charger. A large load such as a washing machine is used. Instead of powering this load by the inverter and using stored energy out of the batteries, the generator is turned on. When the generator is on, the inverter senses it, and after about 60 seconds, throws a transfer switch in the inverter. All loads from the inverter are now put straight through to the generator. Now the large load of the washing machine is powered by the generator. (The batteries are not being discharged.) The inverter

changes its job and becomes a battery charger. Thus the generator is charging the batteries while it is running the washing machine.

At the end of the washing cycle, the generator is turned off. The inverter reverts back to normal and powers the loads of the house. For the rest of the day, small loads are powered from the inverter and the batteries. The next day the generator recharges the batteries while it runs a large load. Most people gradually add PV modules to further decrease the generator running time.

Another common use of the Inverter/Generator/Charger is to decrease the running time of a generator during construction of a remote home. The generator is run to power extended large tool loads, while it charges the batteries at the same time. For the rest of the time the small tools and intermittent use tools, such as a screw gun and a skill saw, are powered by the inverter. The generator is off. After the home is built, you move in and add additional batteries and PV modules.



GENERATOR/INVERTER/CHARGER KITS

Basic Generator Charger Kit #1

1	Magnum MM1512AE Inverter	\$899.00
1	Magnum ME-ARC50 Control	299.00
4	Trojan T-105 batteries	636.00
2	2 ga. Battery Cables	18.00
2	2/0 ga. Battery Cables	24.00
8	Anticorrosion rings	3.20
1	Set 10' 2/0 ga. Inverter cables	139.00
1	Class "T" Fuse Block w/Fuse 200A	69.00
1	MidNite Lightning Arrestor	119.00
1	PV/Generator Hybrid Book	8.00
	Total (priced separately)	\$2214.20

782-013 Special Kit Price \$1909

Basic Generator Charger Kit #2

1	Magnum RD2212 Inverter	\$1459.00
1	Magnum ME-ARC50 Control	299.00
4	T-105 batteries	636.00
2	2 ga. battery cables	18.00
2	2/0 ga. battery cables	24.00
8	Anticorrosion rings	3.20
1	Set 10' 2/0 ga. inverter cables	139.00
1	Class "T" Fuse Block w/Fuse 200A	69.00
1	MidNite Lightning Arrestor	119.00
1	PV/Generator Hybrid Book	8.00
	Total (priced separately)	\$2774.20

782-022 Special Kit Price \$2359

Advanced Generator Charger Kit #2

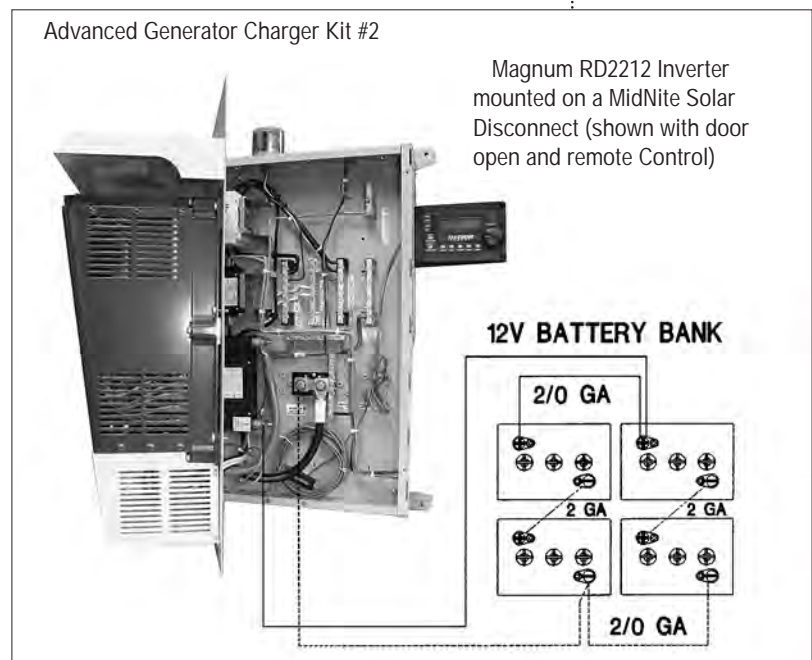
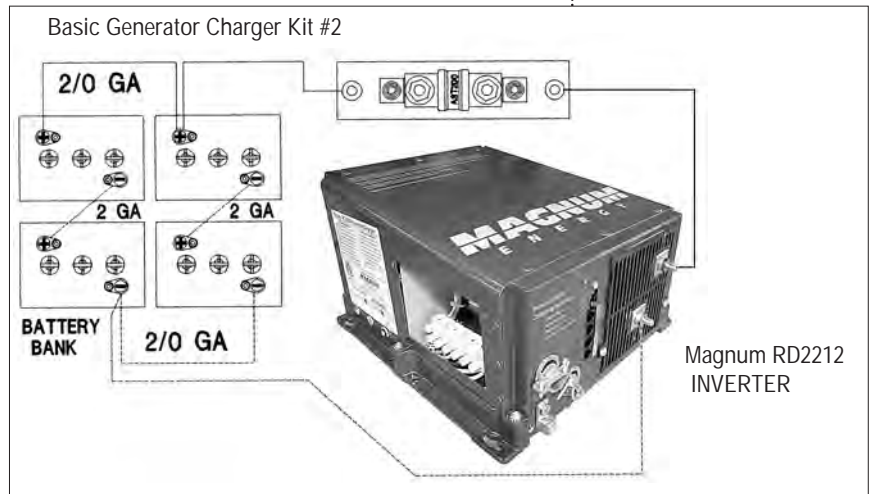
1	Magnum RD2212 Inverter	\$1459.00
1	Magnum ME-ARC50 Control	299.00
1	MidNite AC/DC Disconnect	619.00
4	T-105 batteries	636.00
2	2 ga. battery cables	18.00
2	2/0 ga. battery cables	24.00
8	Anticorrosion rings	3.20
1	Set 10' 2/0 ga. inverter cables	139.00
1	MidNite Lightning Arrestor	119.00
1	PV/Generator Hybrid Book	8.00
	Total (priced separately)	\$3324.20

782-023 Special Kit Price \$2879

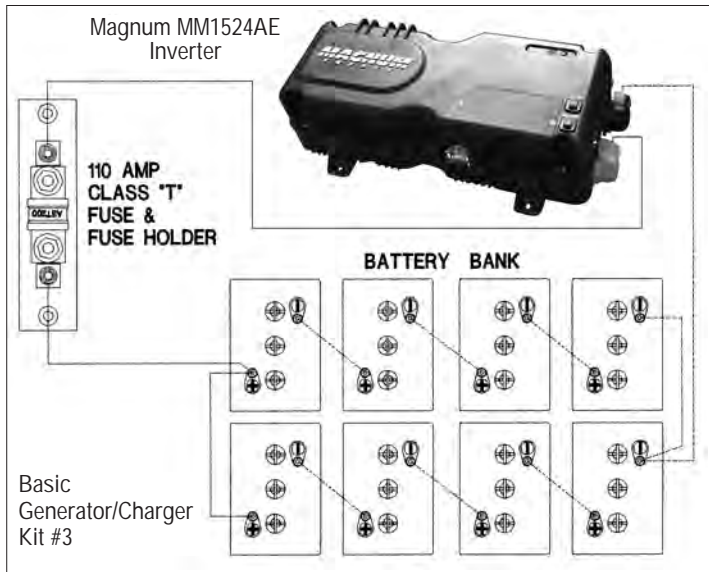
Kit Options

2	Additional T-105 batteries	298.00
1	Hydrometer	12.95
1	Solar Electric Independent Home Book	10.95
1	Battery Book for Your PV Home	8.00
1	Digital Multimeter	25.00

Batteries are shipped to you via common carrier (tractor/trailer). They can only be shipped to a business or commercial address. Please call for a freight quote.



GENERATOR/INVERTER/CHARGER KITS



Basic Generator Charger Kit #3

1	Magnum MM1524 Inverter	\$939.00
1	Magnum ME-ARC50 Control	299.00
8	T-105 batteries	1272.00
6	2 ga. battery cables	54.00
2	2/0 ga. battery cables	24.00
16	Anticorrosion rings	6.40
1	Set 10' 2/0 ga. inverter cables	139.00
1	Class "T" Fuse Block w/Fuse 110A	69.00
1	MidNite Lightning Arrestor	119.00
1	PV/Generator Hybrid Book	8.00
	Total (priced separately)	\$2929.40

782-031 Special Kit Price \$2609

Intermediate Generator Charger Kit #3

1	Magnum RD2824 Inverter	\$1679.00
1	Magnum ME-ARC50 Control	299.00
8	T-105 batteries	1272.00
6	2 ga. battery cables	54.00
2	2/0 ga. battery cables	24.00
16	Anticorrosion rings	6.40
1	Set 10' 2/0 ga. inverter cables	139.00
1	Class "T" Fuse Block w/Fuse 200A	69.00
1	MidNite Lightning Arrestor	119.00
1	PV/Generator Hybrid Book	8.00
	Total (priced separately)	\$3669.40

782-032 Special Kit Price \$3199

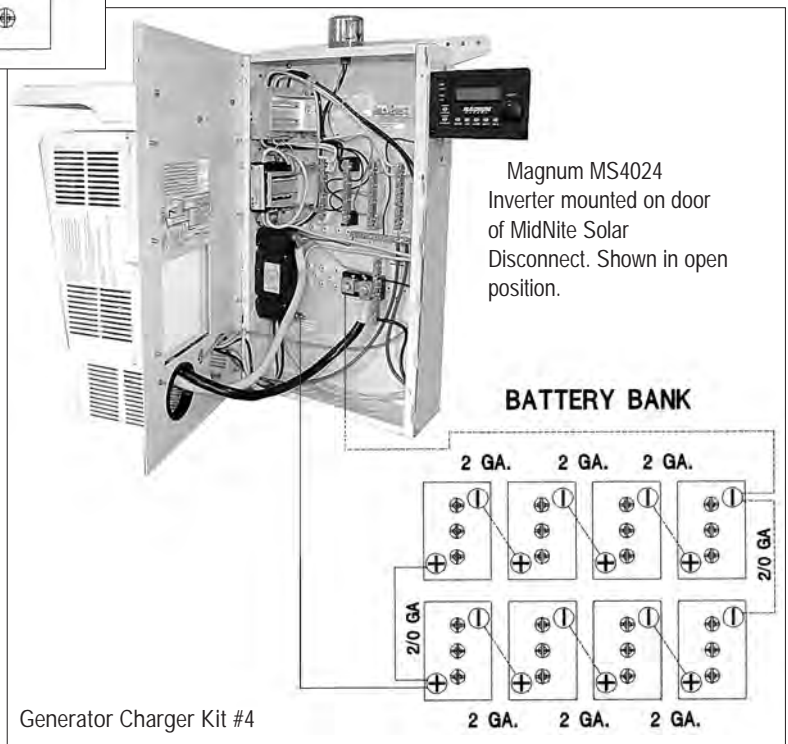
Kit Options

4	Additional T-105 batteries	596.00
1	Hydrometer	12.95
1	Solar Electric Independent Home Book	10.95
1	Battery Book for Your PV Home	8.00
1	Digital Multimeter	25.00

Advanced Generator Charger Kit #3

1	OutBack VFX3524 Inverter	\$2569.00
1	OutBack MATE	295.00
1	MidNite AC/DC Disconnect	619.00
8	T-105 batteries	1272.00
6	2 ga. battery cables	54.00
2	2/0 ga. battery cables	24.00
16	Anticorrosion rings	6.40
1	Set 10' 4/0 ga. inverter cables	219.00
1	MidNite Lightning Arrestor	119.00
1	PV/Generator Hybrid Book	8.00
	Total (priced separately)	\$5185.40

782-033 Special Kit Price \$4479



Generator Charger Kit #4

1	Magnum MS4024 Inverter	\$2699.00
1	Magnum ME-ARC50 Control	299.00
1	MidNite AC/DC Disconnect	799.00
8	T-105 batteries	1272.00
6	2 ga. battery cables	54.00
2	2/0 ga. battery cables	24.00
16	Anticorrosion rings	6.40
1	Set 10' 4/0 ga. inverter cables	219.00
1	MidNite Lightning Arrestor	119.00
1	PV/Generator Hybrid Book	8.00
	Total (priced separately)	\$5499.40

782-043 Special Kit Price \$4749

GENERATOR/INVERTER/CHARGER KITS

Generator Charger Kit #5

1	Xantrex XW4024 Inverter	\$3950.00
1	Xantrex XW DC Disconnect	1800.00
1	Xantrex XW Control panel	300.00
12	Trojan T-105 batteries	1908.00
9	2 ga. battery cables	81.00
4	2/0 ga. battery cables	48.00
24	Battery anticorrosion rings	9.60
1	Set 10' 4/0 Inverter cables	219.00
1	MidNite Lightning Arrestor	119.00
1	PV/Generator Hybrid Book	8.00
	Total (priced separately)	8442.60

Kit #5 Options

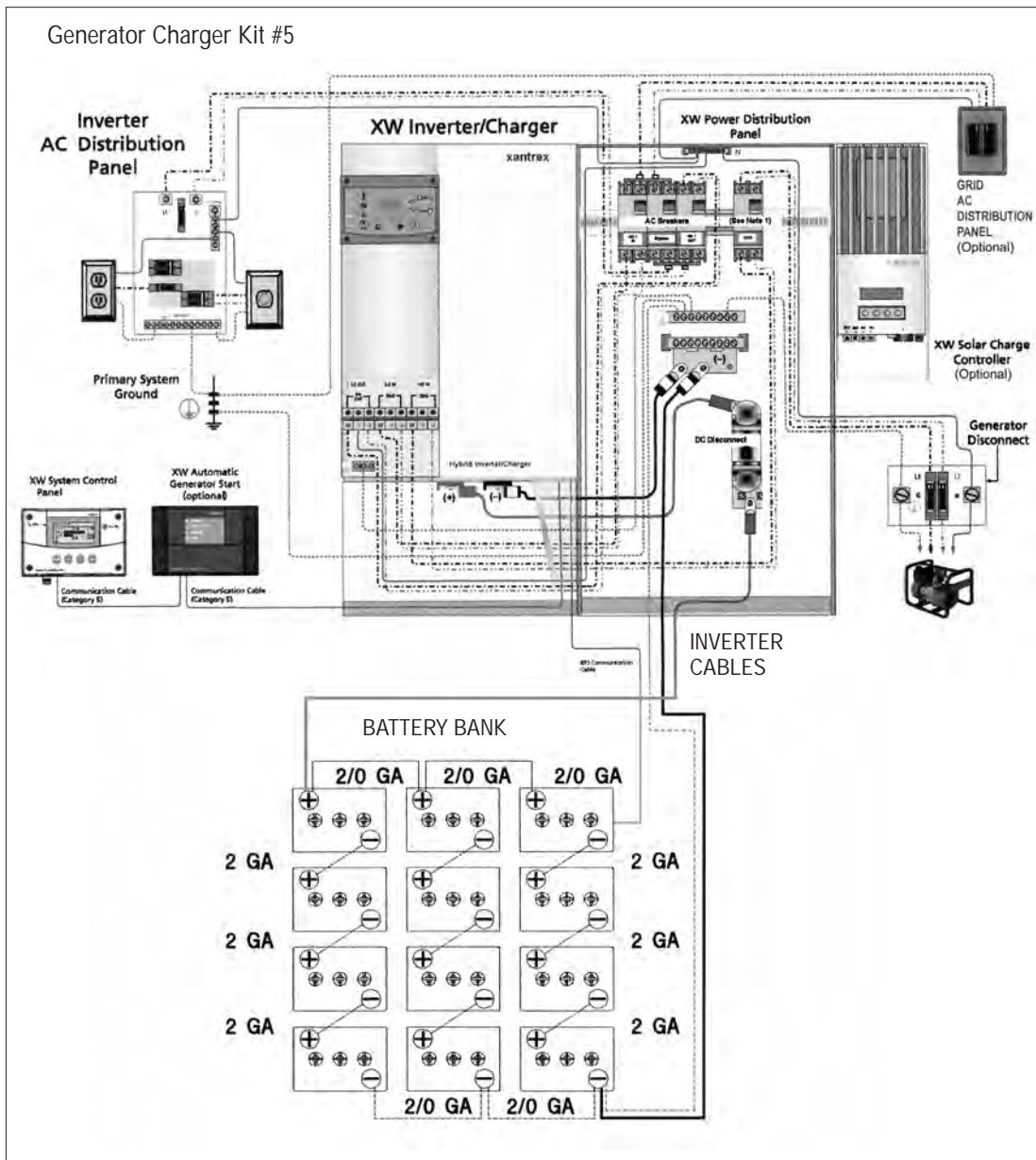
1	Xantrex Auto Generator Start	\$200.00
4	Additional T-105 batteries	\$596.00
1	Hydrometer	\$12.95
1	Solar Electric Independent Home Book	\$10.95
1	Battery Book for Your PV Home	\$8.00
1	Digital Multimeter	\$25.00

782-053 Special Kit Price \$7299

Generator Charger Kit #5 features the Xantrex XW4024 4000 watt 24 volt sine wave inverter. With a large enough battery bank, the XW 4024 could supply backup power to a full size home for a few days. This inverter can control just about any aspect of an integrated power system including full grid tie capability as well as automated generator control. See page 44 of this catalog for more details on the XW4024.

Gen Charger Kit #5 can become a 48 volt kit by adding four more batteries, and switching the inverter to an XW4548.

Kit #5 can also feature a Xantrex XW6048 inverter. Call for prices.



SUNWIZE, POWER-UP and TRINA SOLAR MODULES

All the major manufacturer's modules we carry feature similar, very high quality, manufacturing techniques:

- Tempered Low Iron Glass
- Anodized Aluminum Frames
- EVA (Ethylene Vinyl Acetate) - Tedlar encapsulation with Butyl Edge Seal
- Terminal Boxes on Module Back or MC connectors on the large modules
- Built-in bypass diodes

Currently we feature Sunwize, Power-Up and Trina solar modules in our solar electric kits.

Be sure to check pages 28 to 31 for our complete listing of module racks.

Sunwize Solar Modules

702-110 S110P 110W 12V Solar Module \$369

Sunwize solar modules are manufactured in China and imported by SunWize as a private label brand. Sunwize, being one of the largest alternative suppliers in the US, insures that the 25-year warranty will be supported. Sunwize solar modules feature high quality construction as noted to the left and below:



- Multi-crystalline solar cells
- Tempered low iron impact resistant glass
- Weather-proof junction box
- Anodized aluminum frames
- Built-in bypass diodes
- 25 Year Limited Power warranty

Electrical and Mechanical Characteristics for the S110P	
Module Type	S110P
Maximum Power	110 W
Voltage at Pmax	16.9 V
Current at Pmax	6.5 A
Short Circuit Current	6.7 A
Open Circuit Voltage	21V
Dimensions	
Length	48.38"
Width	26.06"
Depth	1.97"
Weight	21.4 lbs

Power-Up Solar Modules

704-185 BST185-24 185W 24V Solar Module \$269

The Power-UP BST185-24 solar module is manufactured in China and imported by Power-Up. The BST185 high efficiency monocrystalline solar module boasts one of the best 25 year power warranties in the business.

Electrical and Mechanical Characteristics for the BSP185-24	
Module Type	BSP185-24
Maximum Power	185 W
Voltage at Pmax	35.59 V
Current at Pmax	5.262 A
Short Circuit Current	5.695 A
Open Circuit Voltage	44.29 V
Dimensions	
Length	62.20"
Width	29.84"
Depth	1.38"
Weight	40.2 lbs

Trina Solar Modules

708-240 Trina 240 Watt Solar Module \$279

Trina solar modules are being imported from China. They have been in the solar module business since 1997. Trina is "vertically integrated", meaning they make all parts for their solar modules themselves. Trina modules feature the same high quality construction as all brand name solar modules:



Trina 240

- Multi-crystalline solar cells
- Tempered low iron impact resistant glass
- MC4 connector cables
- Anodized aluminum frames
- Built-in bypass diodes
- 25 Year Limited Power warranty
- UL Listed

Electrical and Mechanical Characteristics for Trina Modules	
Module Type	Trina 240
Maximum Power	240 W
Voltage at Pmax	30.1 V
Current at Pmax	7.81 A
Short Circuit Current	8.31 A
Open Circuit Voltage	37.1 V
Dimensions	
Length	65"
Width	39"
Depth	1.57"
Weight	43 lbs

BSP185-24



- Monocrystalline solar cells
- Tempered low iron impact resistant glass
- MC4 connector cables
- Anodized aluminum frames
- Built-in bypass diodes
- 25 Year Limited Power warranty
- UL Listed

SUNWIZE and MITSUBISHI SOLAR MODULES

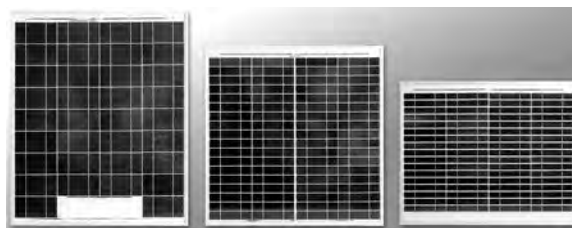
SunWize SP Series Solar Modules

702-040	S40P 40W 12V Solar Module	\$189
702-055	S55P 55W 12V Solar Module	\$229
702-070	S70P 70W 12V Solar Module	\$259
702-090	S90P 90W 12V Solar Module	\$319
702-110	S110P 110W 12V Solar Module	\$369
702-140	S140P 140W 12V Solar Module	\$399
702-150	S150P 150W 12V Solar Module	\$419

SunWize SP Series modules deliver top quality performance for all photovoltaic applications, including rural electrification, water pumping, and general battery charging.

They feature the following industry standard construction:

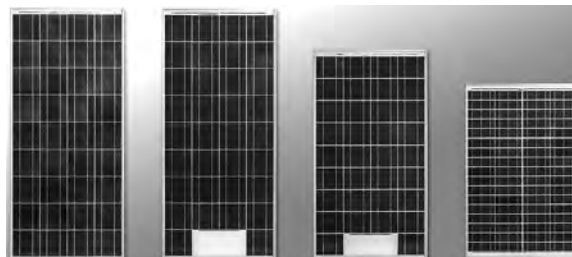
- Single crystalline solar cells
- White Tedlar™ Backing
- Laminated with ethylene vinyl acetate (EVA)
- Tempered low iron impact resistant glass
- Weather resistant junction box (SW180-MC3 Cables)
- Anodized aluminum frames
- Bypass diodes included



SW70P

SW55P

SW40P



SW150P

SW140P

SW110P

SW90P

SP Specifications	S40P	S55P	S70P	S90P	S110P	S140P	S150P
Rated Power:	40W	55W	70W	90W	110 W	140W	150W
Rated Voltage:	17.1V	16.9V	17.1V	16.9V	16.9 V	17.1V	18.1V
Rated Current:	2.3A	3.25A	4.1A	5.3A	6.5 A	8.2A	8.3A
Open Circuit Voltage:	21.0V	21.0V	21.0V	21.0V	21.0 V	21.0V	22.2V
Short Circuit Current:	2.4A	3.40A	4.30A	5.6A	6.7 A	8.5A	8.5A
By-Pass Diodes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Length:	21.38"	26.06"	31.34"	41.02"	48.38"	58.38"	58.38"
Width:	26.06"	26.06"	26.06"	26.06"	26.06"	26.06"	26.06"
Depth:	1.97"	1.97"	1.97"	1.97"	1.97"	1.97"	1.97"
Weight:	9.9lbs	12.1lbs	14.1 lbs	18.1lbs	21.4 lbs	25.4lbs	25.4lbs

SP Specifications	S05P	S10P	S20P	S30P
Maximum Power	5W	10W	20W	30W
Voltage at Pmax	16.5V	16.7V	17.1V	16.7V
Current at Pmax	0.30A	0.60A	1.15A	1.80A
Short Circuit Current	0.33A	0.64A	1.2A	1.90A
Open Circuit Voltage	20.5V	20.8V	21.0V	20.8V
Dimensions	Length	9.92"	12.52"	21.38"
	Width	10.75"	13.86"	13.86"
	Depth	1.97"	1.97"	1.97"
	Weight	2.9 lbs	4.0 lbs	6.2 lbs
Part No.	702-005	702-010	702-020	
Price	\$59	\$89	\$119	



SW30P

SW20P

SW10P

SW5P

702-040	S05P 40W 12V Solar Module	\$55
702-055	S10P 55W 12V Solar Module	\$79
702-070	S20P 70W 12V Solar Module	\$199
702-090	S90P 30W 12V Solar Module	\$159

MODULE RACKS

Our frames are made of structural aluminum with pre-punched holes for easy assembly. Stainless steel hardware is used throughout and instructions with diagrams are included to facilitate assembly. Adjustable frames can be used for roof, wall or ground mounting. Please specify your brand and type of module.

Single Module Mount

719-001

\$35



Four standoff brackets for roof mounting. Stainless steel nuts, bolts and washers are included. Roof seal included as well. Will fit any module.

Two Module Co-Planer Frame

710-021

\$70

Modules mount on two rails and attach to roof with standoff brackets. Stainless steel nuts, bolts and washers are included.

Two Module Adjustable Frame

710-022 For 50 to 85 watts

\$85

710-023 For 100 to 120 watts

\$119

(features large feet)

Modules mount horizontally on two rails and attach to roof with four small feet. Two pieces of aluminum angle are included. You drill final four holes for your custom angle adjustment.

Four Module - Rails & Hardware

710-040

\$100

Modules mount on two rails using stainless steel hardware.

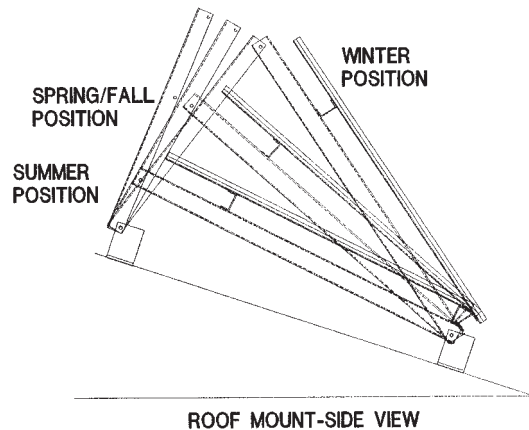
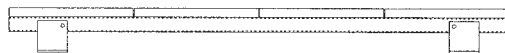
Four Module Co-Planer Frame

710-041

\$159

Modules mount on two rails using stainless steel hardware. Four large feet are supplied to attach this array to your roof.

END VIEW - CO-PLANER FRAME WITH 4 MODULES



ROOF MOUNT-SIDE VIEW

Vertical Mount Adjustable Frames

710-042 Two 120W to 185W Panels \$200

710-044 Four 50W to 110W Panels \$200

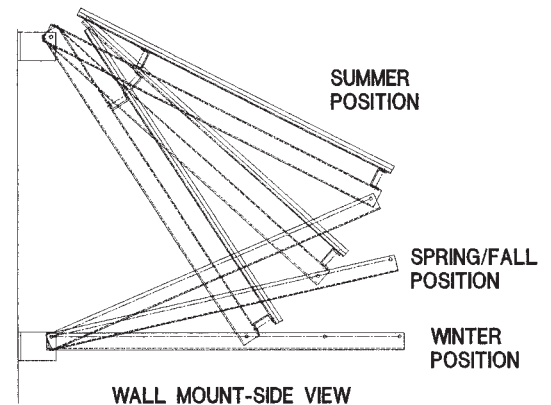
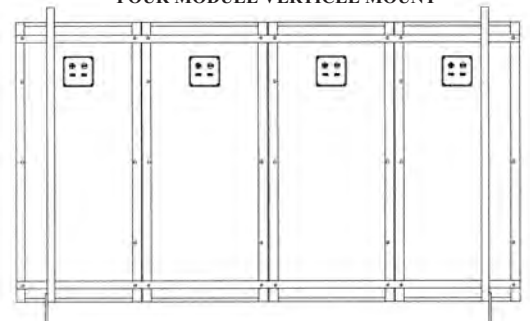
Our Vertical Mount Adjustable Frames will fit four modules of less than 100 watts each or two modules over 100 watts each.

The modules mount on two rails with long dimension up and down to facilitate snow sliding. Two connecting braces tie the two module mounting rails together. Adjustable supports, attached to the connecting braces, angle the array towards the sun. The frame can attach to a roof, a wall or vertical 4x4's in the ground using four large mounting feet. (See drawings for more detail).

All the material needed for attaching the frame to supports is supplied. This includes stainless steel hardware, large mounting feet, hardware to mount the feet to the structure (4"x5/16" stainless steel bolts with toggle wing nuts as well as lag bolts) and a tube of roof sealant.

The adjustment supports come with the first hole punched. Included with the frame is a chart for latitude and roof pitch vs seasonal angle. You drill final adjustment holes according to your particular situation.

REAR VIEW-ADJUSTABLE FRAME
FOUR MODULE VERTICLE MOUNT

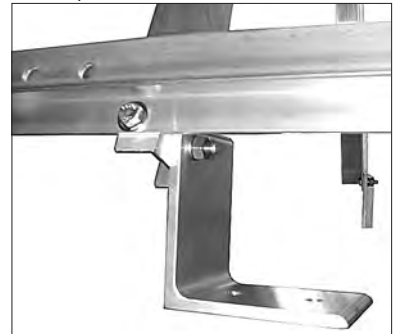


WALL MOUNT-SIDE VIEW

MODULE RACKS



Example: Four module frame shown with only two of four modules on "flat" roof. Detail views at right.



POLE MOUNTED MODULE RACKS

Zomeworks makes excellent module racks for pole mounting. These racks are made of painted A-513 structural steel. They mount on either the top or side of a pole placed in the ground. The pole could also be mounted to the end of a building. Poles are **NOT** included in the price of the racks. All racks are delivered directly to you from Zomeworks. Delivery time is usually three to four weeks and exact UPS shipping (or freight for the big racks) will be added to the price of the rack.



Zomeworks Top-of-Pole Racks

710-999 Specify Size

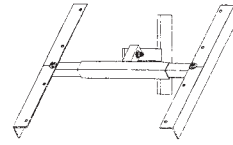
Zomeworks has completely reworked its Top-of-Pole Rack line. The four available models are the FX3, FX4, FX6 and FX Series. All are constructed of type A-513 painted structural steel with mill finish, structural aluminum, mounting rails. The solar modules are fastened to the rails utilizing stainless steel J-Clips with 1/4" stainless steel mounting hardware.

Below the racks are listed by number of modules per rack with a price. Call for part numbers and installation details.

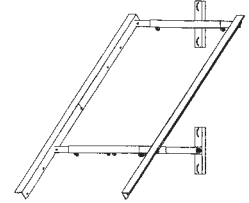
Side-of-Pole Racks

- Seasonally Adjustable
- Constructed of painted A-513 structural steel components with extruded, mill finish, structural aluminum mounting rails
- Utilizes stainless steel J-clip with 1/4" stainless steel mounting hardware

UPST



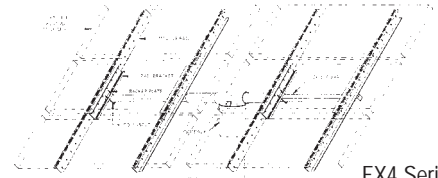
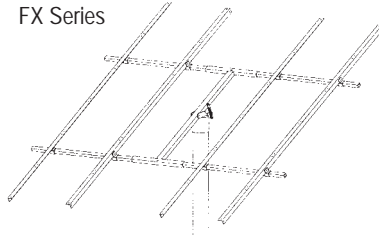
UPSV



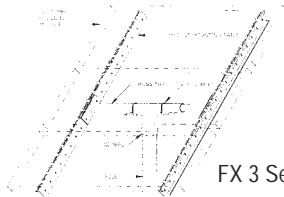
Zomeworks Side of Pole Racks

Model	UPST22M	UPSG32M	UPSG43M	UPSV54M	UPSV65M
Price		Please Call For Quote			
Weight (Lbs)	18	20	23	28	32
BP Solar					
BP350U	1		2		3
BP380U	1		2		3
BP150/160			1		
Shell					
SM50H	1	2	3	4	
SM55	1	2	3	4	
SQ75/80	1		2		3
SM100		1		2	
SunWize					
SW85/90	1		2		3
SW100/115/120			1		

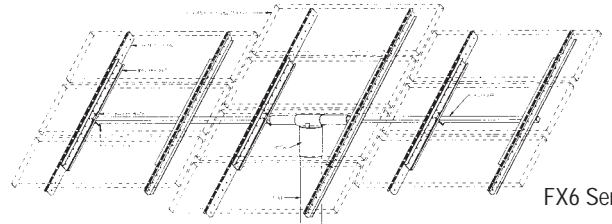
FX Series



FX4 Series



FX 3 Series



FX6 Series

Zomeworks Top of Pole Racks

Listed by price per number of modules. Call for part numbers and installation information. Prices do not include poles.

No. of Modules:	1	2	4	6	8	10	12	14	16
Module Size:									
50W to 65W	\$276	\$288	\$375	\$590	\$663	\$1238	\$1238	\$1238	\$1708
70W to 90W	\$276	\$308	\$403	\$639	\$690	\$1238	\$1333	\$1646	\$1981
100W to 125W	\$276	\$308	\$356	\$572	\$646	\$1238	\$1333	n/a	n/a
160W to 185W	\$288	\$319	\$786	\$1238	\$1333	\$1646	\$2273	n/a	n/a
230W to 240W	\$288	\$476	\$1238	\$1333	\$1646	for 9 \$1981	n/a	n/a	n/a

Zomeworks Track Rack

710-998 Specify Size

Track Rack from Zomeworks is a passive solar tracking system for photovoltaic modules. Since 1980, more than 5100 Track Racks have been installed in different climates on nearly every continent in the world. As dependable as gravity and as reliable as the heat of the sun, more than 99% of Zomeworks trackers are still in operation today.

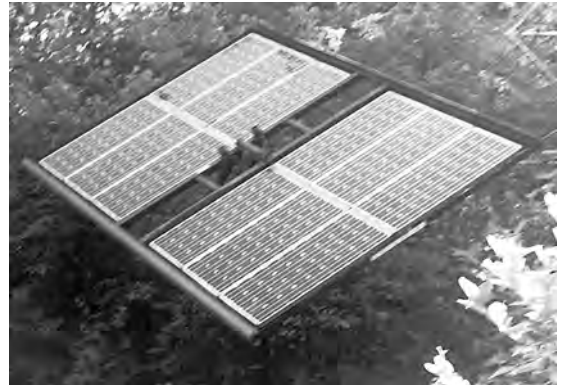
Track Racks increase electrical output of photovoltaic modules by 25% or more compared to modules on fixed mounts. Track Rack passive solar trackers are a highly cost-effective component for domestic and industrial photovoltaic power systems, water pumping systems, cathodic protection systems, and utility applications.

Simplicity and durability of the Track Rack design is unsurpassed. Track Racks are engineered for unmatched reliability and do not rely on drive motors, gears, clutches, high-tolerance pistons, electronics, batteries, or sun sensors. The Track Rack drives its tracking motion with a simple, elegant design that uses the sun's heat to move liquid through a sealed system integrated into its structure. As liquid moves from one side of the rack to the other, gravity causes it to rotate and follow the sun.

Standard Track Racks are constructed of mild steel and finished in satin black urethane paint. Stainless steel module mounting hardware is provided with all Track Rack systems.

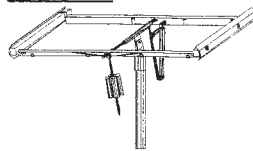
Track Racks are easy to install. They are designed to slip over SCH 40 steel pipe masts set in concrete and are locked into place by tightening one bolt.

Track Racks feature manual north-south axis adjustment settings of 2°, 15°, 30°, and 45° for optimal seasonal performance. Most users adjust their Track Racks twice a year.

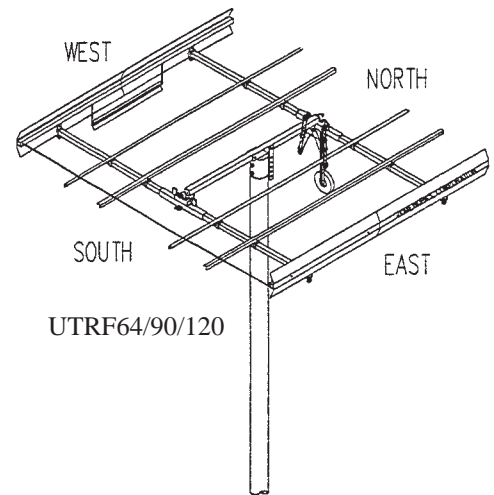
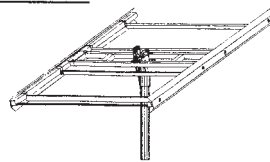


Typical Track Rack for 12 Solar Modules

UTR020



UTR040



UTRF64/90/120

Zomeworks Universal Track Rack Module Specifications (Seven Sizes Fit All)

Track Rack Model	UTR-020	UTRK-040	UTRF-64	UTRF-090	UTRF-120	UTRF-168-2
Price	\$819	\$1,668	\$2,208	\$2,496	\$2,820	\$4,182
*Added Rails:			\$335		\$335	\$335
Module Size:						
50W to 65W	1-2	3-4	6-12	n/a	n/a	n/a
70W to 90W	1-2	3-4	5-6*	6-8	10-12*	14-16
100W to 125W	1-2	3-4	5-6*,7*	8-10	12-14	16-18*
160W to 185W	1	2	3-4	6	8	10-12*
230W to 240W	1	2	3	4-5*	7*-8-9*	10-11*-12*
Size (Inches)	67 x 36	107 x 67	124 x 136	144 x 148	144 x 160	169 x 192
Shipping Weight (Lbs)	95	170	400	490	525	600
Pipe Diameter (Inches) (Sch 40 Steel)	2.5	3	6	6	6	8
Min Pole Height (Inches)	76	84	96	108	120	144
Min Pole Depth (Inches)	38	42	48	54	60	72
Recommended hole diameter, filled with concrete (Inches).	18	18	24	24	24	33

CHARGE CONTROLLERS

Charge Controller Basics

Solar modules produce electricity when the sun shines. The charge controller regulates the flow of electricity from the solar modules to the battery bank. When the battery bank is low, the charge controller feeds all of the electricity from the array to the batteries. When the batteries reach a state of full charge, the charge controller stops or redirects the supply of electricity to prevent overcharging. Modern charge controllers have the ability to hold the battery bank in a "float" state of charge if the bank is not being used. At night the charge controller prevents a reverse flow of current from the batteries to the modules.

There are three basic types of charge controllers - series, shunt and pulse-width-modulated. A series controller, the most basic type, acts as a switch to disconnect and re-connect the solar modules to the battery bank. A shunt type controller redirects the current from the solar modules - either by simply short-circuiting the array or by directing the current to some other load. Pulse-width-modulated charge controllers, the most up-to-date type, maintain the battery bank in a float state of charge. "Float" is the voltage level just below gassing voltage. Keeping the batteries in this state of charge delivers their best possible life without using excessive electrolytic.

Charge controllers are generally selected by their size or ability to control a given amount of current, and by their operating voltage. Listed on this and the next few pages are some of the most popular and effective charge controllers on the market.

Xantrex Charge Controllers C35, C40 and C60

730-035	C35 35A, 12 or 24 volt	\$119
730-040	C40 40A, 12, 24 or 48 volt	\$159
730-060	C60 60A, 12 or 24 volt	\$199



C40 without CM on left and with CM on right.

The C35, C40 and C60 charge controllers are 3 stage solid-state, pulse width modulated devices. They work as charge controllers, DC load controllers or DC diversion regulators. They are electronically protected for short circuit, overload, over-temperature and reverse polarity conditions. They will control 12V, 24V and in the case of the C40, 48V PV systems. They feature field adjustable set-points, automatic or manual battery bank equalization settings and status LED indicators. As their names suggest, the C35 is rated for 35 amps, the C40 for 40 amps and the C60 for 60 amps. But they will actually control up to 60 amps before they self limit. They each have automatic high current overload protection which simply turns the unit off until the high current condition is removed. Restart is automatic. Each can be fitted with a digital meter as an option which monitors battery bank voltage, array current and amp-hours.

Xantrex CM for C35, C40 and C60 Digital Volt/Amp/Power Meter

730-041	CM/C35,C40,C60	\$99
730-042	CM R/50' Remote	\$126
730-043	CM R/100' Remote	\$146

Battery Temperature Sensors

741-032	15' BTS/15	\$29
741-033	35' BTS/35	\$32

For use with all Trace charge controllers and Trace DR and SW Plus inverters

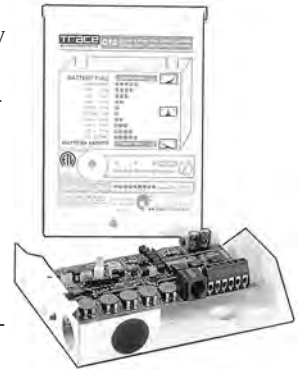
The Xantrex CM displays volts, amps, and cumulative amp-hours for the solar array. It mounts directly on the C35, C40 or C60. The CM R/50 or R/100 can be remotely mounted up to 50' or 100' away, respectively. All three versions of the CM have a backlight LCD Display. The Xantrex remote meters require a dual-ganged electrical box for mounting. See page 16 for a surface mount version.

Call Toll Free: (800) 914-4131

Xantrex C12 Charge/ Load Controller

730-012	12 amp, 12 volt only	\$110
---------	----------------------	-------

The C12 was designed to completely control small systems, automatic lighting systems and unattended remote systems. It can function as a charge controller, load controller and lighting controller at the same time. The C12 can regulate either wet or sealed lead-acid batteries. Its automatic equalization capability makes the C12 an ideal controller for unattended lead acid battery banks. Excellent installation instructions and Trace's standard 2 year warranty are included.



SCI ASC-8/12 Charge Controller

731-008	12 volts, 8 amps	\$53
731-009	24 volts, 8 amps	\$53

This is a small, compact, epoxy encapsulated charge controller that will work with an array output up to 8 amps (two 50W modules, or one 110W module). The ASC-8 has a red LED which lights while charging and flashes as the battery bank reaches full charge. This controller is most often used on one module systems that will not later become large systems.



C35 Charge Controller with CM Meter attached.



CM R/50 Remote

CHARGE CONTROLLERS

Morningstar Charge Controllers



TriStar TS-45
with Meter

We now carry the full line of Morning Star charge controllers: the TriStar, ProStar, SunSaver and SunGuard charge controllers as well as the SunLight lighting control. The TriStar will fit into any of our pre-wired power panels or charge controller panels. It is fully protected (short circuit,, reverse polarity and overload) and is rated at 45 or 60 amps at

12 to 48 volts. Both remote and attached meters are available for the TriStar. The ProStar and SunSaver offer low battery disconnect from 6 to 30 amps and 12 to 48 volts. The SunGuard is an inexpensive 4.5A 12V controller and the SunLight Controller allows 10 lighting options at 10 to 20A at 12 or 24V. Morningstar has many more options in their charge controller line than we have room to list here. Please call for more details about this versatile line of charge controllers.

736-045	TriStar TS-45 45A 12 to 48V	\$174
736-060	TriStar TS-60 60A 12 to 48V	\$233
736-047	TriStar Digital Meter	\$113
736-003	TriStar Remote Digital Meter	\$136
736-001	Remote Temperature Sensor	\$32
736-210	SunSaver 10A 12V	\$57
736-210L	SunSaver 10A 12V w/LVD	\$72
736-310L	SunSaver 10A 24V w/LVD	\$79
736-406	SunGuard 4A 12V	\$34

Morningstar also has maximum power point tracking (MPPT) charge controllers available. They have MPPT versions of their popular TriStar TS-45 and TS-60 as well as a less powerful model, good for small systems.

736-145	TS-MPPT-45 45A 12 to 48V	\$547
736-160	TS-MPPT-60 60A 12 to 48V	\$689
736-147	Digital Meter for MPPT	\$104
736-103	Remote Meter for MPPT	\$147
736-	MPPT SunSaver 15A 12 & 24V	\$286



SunSaver
15A MPPT

Steca Charge Controllers

737-010	PR 1010 12/24V 10A	\$150
737-015	PR 1515 12/24V 15A	\$279

Steca charge controllers are made in Germany and incorporate all the aspects of German engineering that one would expect.



Steca PR1010

The controllers include a load controller as well as a charge controller. They feature an LCD meter which monitors state-of-charge in percent, array current and battery bank voltage. The meter also monitors load current. The current rating is for both charge and load control. The included manual guides you through very thorough installation and operation procedures. A very nice charge controller for someone who wants excellent control for a smaller system.



SunSaver 10 w/LVD



Tri-Star MPPT Charge Controller
with attached digital meter.

MPPT CHARGE CONTROLLERS

Maximum Power Point Tracking

Many people have asked about power point tracking and whether it has any real advantages. Maximum Power Point Tracking (MPPT) converts the difference between a solar module's rated voltage, (usually 17 volts) and a battery bank's charging voltage (up to 14.7 volts) into usable charging current. Often claims are made for up to a 30% increase in charging current. This gain, however, is possible under a very limited set of conditions. The "extra" module voltage is there for a reason: to allow for real world use of the solar module, i.e. the voltage drop caused by the array wiring and other components, including the charge controller, between the solar array and batteries. Also, high ambient temperatures cause the solar module to drop in voltage further reducing this "extra" voltage.

Having said that, there are times when the voltage difference will be high enough to provide extra current to a battery bank utilizing this type of charge controller. Cold weather comes to mind, as well as low battery bank voltage. Under these conditions, it can be possible to get as much as 10% to 30% more current from your solar modules.

A more important use for the MPPT charge controllers featured on this page, is the ability to use higher voltage arrays to charge lesser voltage battery banks, i.e. a 48 volt array can charge a 24 volt bank (or even a 12V bank). The higher voltage means less current through the array wires and therefore less voltage drop. Longer distances can now be done using smaller wire sizes. This is a very important feature of these particular charge controllers.

MidNite Classic 150 Charge Controller

757-110 Classic 150 Charge Controller \$850

The MidNite Classic charge controller features maximum power point tracking (MPPT) which allows all available energy to be extracted from the solar array. (See the side bar for a more detailed description of MPPT). The Classic is also the only charge controller to meet all requirements of the 2011 National Electric Code, including built-in ground-fault and arc-fault protection. The Classic substantially increases the flexibility, features and range currently found on MPPT controllers.

- 5 Year Warranty
- Integrated PV Ground Fault & Arc Fault Protection
- 150, 200 and 250V operating voltages
- Three Stage Controller: Bulk, Absorption and Float
- Reverse Current Protection
- Over and Under Voltage Protection
- Output Over Current Protection
- Remote & Local Display Option showing Battery Bank Voltage, Array Current and Battery Charging Current
- Dimensions (inches): 14.91H x 6.00W x 3.94D



- Ethernet, USB and RS232 (20 megs data logging)
- Battery Temperature Sensor Included
- Programmable Output for Battery Box Vent Fan
- UL 1741 and CSA Certified

Xantrex XW MPPT60-150 Charge Controller

730-061 XW-60 Charge Controller \$685

The XW charge controller features maximum power point tracking (MPPT) which allows all available energy to be extracted from the solar array.



The XW can be used with 12, 24, 36, 48 and 60 volt battery systems. It is also capable of charging a lower voltage battery bank with a higher voltage array. This allows longer array wiring runs without the higher cost of larger wire while still maintaining maximum array output. The MPPT power points are constantly adjusted to maintain

maximum array output for all sunlight conditions. The XW 60 is capable of 60 amps charging current into the battery bank and can withstand 150 VDC open circuit voltage from the array.

- 5 Year Warranty
- Integrated PV Ground Fault Protection
- Three Stage Controller: Bulk, Absorption and Float
- Reverse Current Protection
- Over and Under Voltage Protection
- Output Over Current Protection
- Digital Display Option showing Battery Bank Voltage, Array Current and Battery Charging Current
- Battery Temperature Sensor Included
- Programmable Output for Battery Box Vent Fan
- UL 1741 and CSA Certified

Outback Charge Controller

735-060 Outback FLEXmax60 \$749

735-080 OutBack FLEXmax80 \$849

The Outback FLEXmax Series charge controllers are maximum power point tracking charge controllers with the ability to charge lower voltage battery banks with higher voltage arrays. That means it could charge a 12VDC battery bank with a 48V or 24V array.

This ability to work on a 12V to 60V battery bank with an open circuit voltage of up to 150V allows your system to achieve its greatest possible performance.

The FLEXmax60 and 80 have a backlit LCD display which monitors system performance and is also used for programming system operation. These are among the finest charge controllers on the market.



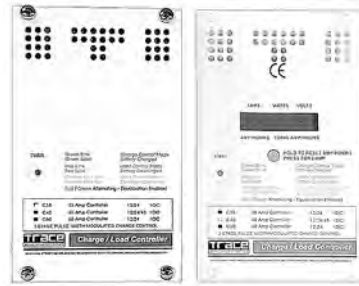
- Output Current 60A, 80A
- Nominal Battery Voltage 12,24,32,36,48,60 VDC
- PV Open Circuit Voltage 150V Rated
- Charging regulation Methods Bulk, Absorption, Float, Silent and Equalization
- Voltage Regulation Set-points 10 to 80 VDC
- Equalization Voltage Up to 5V above Absorption
- Digital Display 4 Line, 80 character
- Warranty Standard 5 Year
- Dimensions Fm 60 13.5" H x 5.75" W x 4" D
Fm 80 16.5" H x 5.75" W x 4" D

CHARGE CONTROLLER KITS

Charge Controller Kit #1

783-001 For both 12V and 24V systems \$199

This kit consists of a Trace C35 charge controller and a Trace CM meter set. The CM digital meter takes the place of the original C35 cover plate. This has what you need for a small cabin PV system or an RV system. The C35 can handle up to 35 amps at either 12 or 24 volts DC. The C35 has integral over current protection. If an over current condition is present, the C35 shuts down, and restarts automatically when the condition is removed. For added safety, a fuse should be added between the controller and the positive wire to the batteries. See page 32 for more information on the C35.



Charge Controller Kit #1:
C35 and CM Digital Meter

Charge Controller Kit #2

783-102 For both 12V and 24V systems \$259

This kit consists of a Trace C35 charge controller, a Trace CM meter set and a MidNite "Big Baby Box" with two circuit breakers. This kit is the same as Kit #1 with the breakers included for a main disconnect and array disconnect. There is room for two more circuit breakers for DC loads. The Big Baby Box also includes a negative bus-bar. You do the wiring.



Charge Controller Kit #2:
Big Baby Box and C35
+ CM Meter

Charge Controller Kit #3

Pre-wired with a C-Series Charge Controller and CM Meter

- 783-103 With C35 & CM 35A, 12V & 24V \$459**
- 783-104 With C40 & CM 40A, 12V, 24V \$499**
- 783-105 With C40 & CM 40A, 48V/L. Arrestor \$589**
- 783-108 With C60 & CM 60A, 12V & 24V \$529**
- 783-201 One Additional 15A DC Load Breaker add \$23**
- 783-202 Two Additional 15A DC Load Breakers add \$36**
- 783-203 Three Additional 15A DC Load Breakers add \$63**

Most PV system buyers now take advantage of this option. For a small amount more than the individual components, you get a pre-wired set of controls. This kit consists of a C35, C40 or C60, a CM meter, an array disconnect, a controller disconnect, a lightning protector and a 10 foot, #6 ga. cable with lugs for battery connection. The circuit breakers and a terminal strip for the array input are pre-wired in a MidNite Solar Mini-Disconnect Panel, creating an integral and labeled unit. Just run the wires in from the solar modules and connect the 6 Ga. cable to the batteries and you are all set. Specify array size and we will size the circuit breaker for you (20A, 30A, 40A, 63A).

Up to three additional DC circuit breakers can be added to this assembly for DC load circuits. This makes the CC Kit #3 an ideal complete solution for DC wiring in a camp or cabin.



Charge Controller Kit #3: Exterior and Interior Views

Charge Controller Kit #4

Prewired with an MPPT Charge Controller

- 783-1 With MidNite Classic 150 Charge Controller \$1099**
90A, 12V to 72V, NEC Compliant
- 783-114 With OutBack FM-60 60A, 12V to 60V \$989**
- 783-116 With OutBack FM-80 80A, 12V to 60V \$1099**
- 783-115 With Xantrex XW60 60A, 12V to 60V \$939**

Charge Controller Kit #4 has an MPPT charge controller mounted on the door of a MidNite Mini-Disconnect panel. The controller disconnect is a DC circuit breaker breaker sized for the charge controller (60A to 90A). The array disconnect is also a DC circuit breaker sized for your array download. The breakers are labeled as to function and voltage. A 10' #4 or #6 AWG cable with lugs for connection to the battery bank is included. A MidNite Lightning Arrestor is also wired on the array input terminal strip. All wiring and circuit breakers are in place and ready to go. Just run the array cable in from the solar modules and connect the battery cable to the battery bank. CC Kit#4's can have one to three breakers added for DC loads.



Charge Controller Kit #4 with Classic 150

Note: In order for CC Kit # 3 or CC Kit #4 to meet the National Electrical code, a ground fault interrupt breaker set must be added to the kit (except for the Classic 150). This would add \$69 to the kit price.

DISCONNECTS and ARRAY WIRING DEVICES

Array/Controller Disconnect

753-010 15A to 63A, 12 or 24V **\$99**
Extra Breakers **\$15 Ea.**



You will need to have a fused-disconnect (DC circuit breaker) between the module array and the charge controller and between the charge controller and the battery bank. We now offer both disconnects in one small box and include a negative bus bar. We label the box for you, and best of all, you can even add two DC load circuit breakers if needed. The breakers are available in 15, 20, 30, 40, 50 or 63 amps. The array breaker must be at least 33% greater than the amperage output of your array and at least 50% greater if you will have winter snow reflection in your climate. The controller circuit breaker (battery disconnect) should be sized for the size charge controller you have. Because the included breakers were specifically designed for DC use, no extra fuses are required.

MC4 Module Interconnects

Tyco Module Interconnects

Module interconnects are sold in pairs having one male and one female connector crimped onto 20' of 12 ga USE wire. Each wire is color coded for polarity: red for positive and black for negative. We can supply both MC4 and Tyco type connectors.

310-002 MC4 Pair of 20' Cables **\$39**
Longer than 20' add **\$1.40 ft**

310-003 Tyco Pair of 20' Cables **\$39**
Longer than 20' add **\$1.40 ft**



MC4 Type Connectors



AC/DC Lightning Arrestor

757-020 MidNite Lightning Arrestor **\$119**
 Up to 300V DC or 250V AC

The MidNite MNSPD300 can be used anywhere a lightning arrestor is needed: either AC or DC. The three major uses are between a remote generator and inverter, typically at the inverter end, between an array and charge controller at the charge controller end and possibly at the array combiner box to protect imbedded by-pass diodes. One could also be used to protect a submersible pump. Although this lightning arrestor is more expensive than the previous versions we sold, the SPD300 has been tested to actually work. The response time is less than a micro-second. Diagnostic blue LEDs light when voltage is present between L1 & Gnd and L2 & Gnd letting you know the unit is actually functioning. (Please note when protecting an array or the array side of a charge controller, the LEDs will be off when the sun is not present.) We now use the MidNite lightning arrestor in all our pre-wired kits.



DC Lightning Protectors

330-001 12V, 24V or 48V DC **\$16**



Every PV system needs a lightning protector between the module array and the charge controller. This is most conveniently installed in the array disconnect circuit breaker box. This unit is designed to work with 12 or 24 volt systems.

Array Junction Boxes

These are weather-proof plastic UL listed wiring boxes complete with cover and gasket. They are used to make connections between the array wiring and the array down-lead wires. You locate and drill the holes (using an inexpensive 13/16" spade bit) for the weather-tight connectors. Connection can be made using the terminal blocks or split bolt connectors listed below. The boxes can also serve as weather heads on electrical conduit.

355-006 6" x 6" x 4" **\$24.00**
355-008 8" x 8" x 4" **\$46.00**

ARRAY WIRING DEVICES

PV Combiner Boxes

757-103	MidNite MNPV3 10.5" x 5" x 3.25"	\$99.00
757-106	MidNite MNPV6 12.75" x 8" x 3.25"	\$119.00
757-112	MidNite MNPV12 14.5" x 12" x 3.5"	\$179.00
343-0xx	MNPV Circuit Breakers 10,15 and 20 Amps 10,000A interrupt current	\$15.00



MNPV

354-010	MNTS Fuse Holder 600VDC	\$6.25
344-0xx	MNFUSE 6,10,15,20 Amps	\$6.25

A PV combiner box provides a convenient way to meet the NEC requirements for series fusing of PV modules.

MidNite Solar makes 3, 6 and 12 position PV combiner boxes. They are each housed in a gray aluminum rainproof enclosure and accept three, six or 12

150VDC breakers respectively. The MNPV6 will accept four 600VDC touch safe fuse holders and the MNP12, ten 600VDC fuse holders for grid-tie arrays. Each has both a negative bus and ground bus which accept up to 1/0 AWG wire size. The positive bus also accepts 1/0 AWG wire. Maximum total output current is 120 amps.



MNPV6 & MNPV3



MidNite Solar MNPV6: Open and Inside Views

Weathertight Connectors

Weathertight connectors are used to maintain a weather -or water- tight seal around module interconnect wires as they exit a module or array junction box. They also act as a strain relief. Two types are used when wiring arrays: a plastic connector for #12 USE module interconnects and a plastic connector with a rubber insert for #10 UF array down-lead cable (if used).



Weathertight Connector for Modules

353-001	\$3.00
---------	--------

Weathertight Connector for #10 UF cable

353-009	\$9.00
---------	--------

Split Bolt Connectors

These are used to connect two copper wires together in a junction box. They must be covered with several layers of electrical tape afterwards to insulate them.



323-008	8-10 ga. Wire	\$3.75
323-006	6 ga. Wire	\$5.00
323-004	4 ga. Wire	\$7.00
323-002	2 ga. Wire	\$7.60

Solderless Lugs

These wire end connectors can be used when crimped or soldered connectors are not available. However we would not recommend making your own battery cables with these connectors.



324-006	6 to 14 ga. wire, 3/16" ring	\$1.20
324-004	4 to 14 ga. wire, 1/4" ring	\$1.40
324-300	3/0 to 4 ga. wire, 3/8" ring	\$4.50

Terminal Block

325-004	\$11
---------	------

This is a four position terminal block rated for 85 amps. It will accept up to 4 AWG wire. It can be used to facilitate wiring between your array and charge controller.

L 2-3/8" D 1-1/4" H 1-1/8"



Terminal Block

325-006	\$8
---------	-----

This is a six position terminal block rated for 63 amps. It will accept up to 6 AWG wire. It can be used to facilitate wiring between your array and charge controller.

L 3-3/8" D 1-1/16" H 1-1/16"



BATTERY MONITORING SYSTEMS

About the only real maintenance necessary on a photovoltaic system is to the battery bank. And probably the easiest way to keep track of your battery bank's health is by monitoring its voltage. Paying close attention to your battery bank voltage, especially for the first few months you own it, will go a long way to increasing its life and keeping your system working properly.

We offer several types of monitoring systems, from a simple voltmeter to a much more elaborate battery monitoring system. Many of the charge controllers come with monitoring LED's. While these are somewhat useful, they can be confusing at times. We strongly recommend getting, and using (!), some sort of voltage monitoring equipment on you system.

We include a Battery Care Sheet with almost everything we sell. We now include a Battery Book with any battery bank or system purchased from us. Either of these will instruct you on how to use a voltmeter to monitor your system, and what the various voltmeter readings mean.

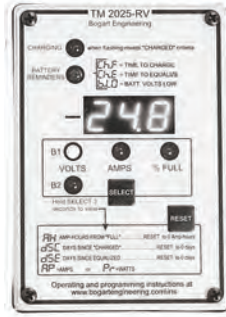
One last note: even though you may have a system voltmeter or monitor, a hand held digital voltmeter (DVM) comes in real handy to measure individual batteries within the bank. This type of voltage measurement is a quick way to check the status of each battery and hence insure the entire bank is working correctly.

Tri-Metric Battery Monitor

369-006 Model 2025-RV \$169

The Tri-Metric is a high quality digital meter which monitors three major battery functions:

- Volts
 - Amps
 - Amp-Hours
- 6 other parameters:
- How many days since the batteries were fully charged
 - How many amp-hrs from full charge
 - Days since equalized
 - Total charge removed since batteries were fully charged
 - Minimum Battery Volts
 - Maximum Battery Volts
- and 3 battery reminders:
- Time to charge full
 - Time to equalize
 - Battery volts low



It works on 12, 24 and 48 volt systems . Pushing a button on the front panel selects which function will be seen on its LED display. The display draws only .02 amps and can be switched off if desired. Other LEDS indicate a fully charged battery or one that is being charged. Voltage readings are accurate to 0.1 volt between 8 and 35 VDC.

The Tri-Metric meter requires either a 100 amp or 500 amp shunt. The Tri-Metric meter is accurate to 3% using either shunt, but the 100mA shunt gives an extra digit of resolution on current readings below 100 amps. Most inverters, however, require more than 100 amps, so most everyone will need the 500 amp shunt.

Total amp-hours can be measured from +999 to -999 within 3%. A net discharge causes the meter to add amp-hours to its total while a net charge causes amp-hours to be subtracted. When the adjustable "charge criterion" is met the amp-hour meter resets itself to zero. This criterion is set by the user depending on battery bank and charging system type.

PentaMetric System Monitor

369-009 Pentametric Input Unit \$199

369-010 Pentametric Display Unit \$179

369-011 P-M Computer Interface \$89

The PentaMetric System monitor has the capability of working on 12V to 48V systems with the ability to measure current from three sources (shunts). It measures volts, amps, amp-hours, watts, watt-hours, temperature and battery % full. It also can perform data logging functions and output the data to a spreadsheet. Amp hours, Watt hours, Temp.max/min, Volts, Amps and Battery % full can be recorded from once a day up to once a minute. Also included is a battery voltage triggered relay (up to 1A) and audible and visual alarms.



PentaMetric Input Unit The Input works with either the Display, the RS232 Interface or both. A rather extensive set of installation instructions is provided with the System and both the software and Instructions are kept up-to-date on the Bogart Engineering website (www.bogartengineering.com).

This is now the System Monitor to get for anyone wanting to achieve complete monitoring and control of and stand-alone alternative energy system.



PentaMetric RS-232 Computer Interface

BATTERY MONITORING SYSTEMS

Remote Shunts

- 368-002 100 Amp, 100 m, Shunt \$23
 368-003 500 Amp, 50 mV Shunt \$28

One of these shunts will be needed with the Tri-Metric Monitor. A shunt is a highly calibrated, very low resistance resistor, which is placed in series (in line) with the wire carrying the current to be measured. Usually a shunt is placed in the negative line near the battery, such that all the current going into and out of the battery must go through it. Instructions for shunt installation are included with the Tri-Metric



Shunt Cable

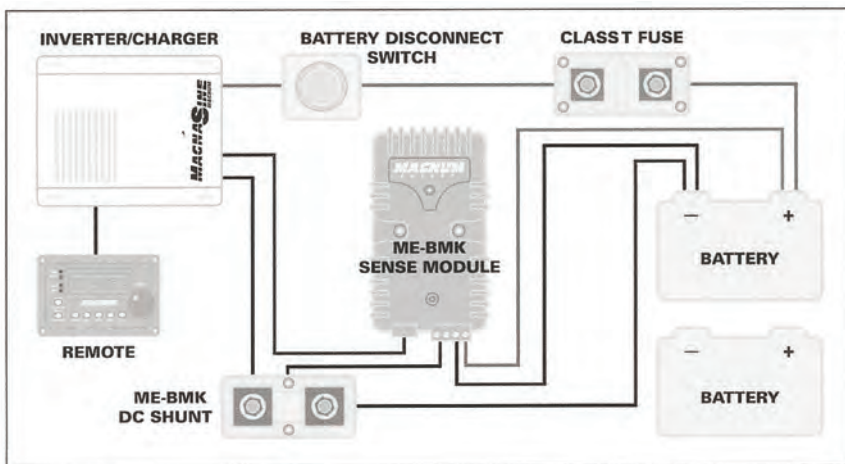
- 369-008 Meter-to-Shunt Cable \$25.00
 22 ga., 50 feet long

One end of this cable is prepared for fastening to the shunt. The other end is attached to the terminal strip in the Tri-Metric meter.

Magnum Battery Monitor Kit

- 747-007 ME-BMK-NS \$209

Monitoring your battery bank is easy with the Battery NMonitor Kit from Magnum Energy. Acting as a "fuel gauge" for your batteries, the ME-BMK monitors their state of charge and then provides this information in an easy-to-understand display via the ME-ARC remote. The ME-BMK-NS requires the Magnum ME-ARC50 remote and a 500A shunt to operate. Usually this monitor is used in conjunction with a Magnum inverter system.



Kill A Watt™ Power Meter

- 369-121 Kill A Watt™ Power Meter \$29



This power meter monitors the power used by any appliance plugged into it. Simply plug the Kill A Watt™ into an outlet and plug the appliance (up to 1800 watts) into it. A large LCD display counts consumption by the kilowatt-hour just like utility companies. It keeps a running total of kilowatts used until you reset it. It also monitors line voltage, load current, line frequency, watts, volt-amps and power factor. This meter will help you figure out just what size solar you might need.

Brand Electronics Power Meter

- 369-120 Model 4-1850 (was \$149.95) \$49.00

The Brand power meter can measure devices requiring up to 1850 watts. It keeps track of kilowatt-hours, average monthly cost, and instantaneous watts being used. For arriving at an average monthly cost figure, you must enter in your cost per kilowatt-hour.

Use of the device is simple: just plug the 4-1850 into the wall outlet and plug the device you want to measure into it.



Sears Digital Multimeter

- 369-003 Model 82141 \$25

The Sears 82141 features all the major functions—AC and DC volts, Ohms and Amps - including a 10A range. The 10A range allows you to test short circuit current of a module or small array. The meter includes a plastic protective holster, test leads and is powered by a 9 volt battery which we include. We highly recommend owning a digital multimeter even though you may have other system monitoring devices. It allows you to check the voltage of individual batteries in your bank and makes trouble-shooting your system a lot easier.



MAGNUM POWER INVERTERS

Magnum 240/120 VAC Inverters True Sine Wave @ 24 & 48 VDC

747-001 MS4024PAE 4000W 24VDC \$2699
747-002 MS4448PAE 4400W 48VDC \$2699

The MS-PAE 120/240V Series Inverter/Charger from Magnum Energy is a pure sine-wave inverter designed specifically for the most demanding renewable energy applications. The MS-PAE Series is powerful, easy-to-use, and best of all, cost effective.

The MS-PAE Series inverters have a Power Factor Corrected battery charger built in which uses 25-30% less AC current than standard chargers. The MS Series also integrates nicely with larger generators with 240/120 VAC output. Its two-leg 240/120 VAC capability allows the generator to operate in a balanced mode, both as a battery charger and for feed-through loads.

We now feature this inverter in some of our solar electric kits as well as a pre-wired power panel. It offers 240/120 VAC operation at a much lower cost than the Xantrex models. It doesn't have all the bells and whistles that the XW inverters have, but it will perform all the tasks a homeowner will need it to do.

Magnum Inverter Control

747-006 ME-ARC50 Remote Control \$299

The ME-ARC50 is simple to use, yet allows full control of all Magnum Inverter/Chargers, the ME-AGS-N network auto generator start module and the ME-BMK battery monitor. It is the only way to customize the operating parameters for all Magnum inverter/chargers. The ME-ARC50 provides convenient finger-tip operation, including the new one-knob programming. It comes standard with a 50', 4-conductor telephone cable and includes non-volatile memory which preserves adjustable settings, even if power to the remote or inverter is removed. Dims: 3.6"H x 8.8"W x 2"D



Automatic Generator Start Modules

747-005 ME-AGS-N Auto Gen Start \$329

This is a three-relay, networked automatic generator start module meant to be used with a Magnum inverter and its remote control. The ME-AGS-N Auto Generator Start controller is networked to a Magnum inverter and can automatically start your generator based on battery voltage or inside temperature. Starts most diesel or gas generators.



747-004 ME-AGS-S Auto Gen Start \$329



This is a two-relay, stand alone automatic generator start module. The ME-AGS-S Auto Generator Start controller is used in applications that do not include a Magnum inverter.



- 3 Year Warranty
- 120/240-volt split-phase, true sine wave output (no need for autotransformer or stacking inverters)
- Super Efficient Battery Charger
- ETL Listed to the stringent requirements of UL1741
- Easy to Install using one of our pre-wire power panel systems

Magnum MS-PAE Series Specifications:

MODEL	MS4024PAE	MS4448PAE
Continuous Power (Watts)	4000	4400
Max. AC Surge Current (Watts)	5800	8500
Peak Efficiency	93%	94%
Search Mode Power	<6 Watts	<6 Watts
Search Mode Defeated (No Load)	27 Watts	25 Watts
Input Voltage Range (VDC)	18.0-33.8	36.0-67.6
Waveform Sine Wave	Yes	Yes
Output Voltage (VAC)	120/240	120/240
Adj. Load Sensing (Watts)	5-50 Adj.	5-50 Adj.
Auto Low Batt Protection (VDC)	18-25 Adj.	36-50 Adj.
Forced Air Cooling:	0-120 cfm Variable Fan	
Automatic Transfer Relay (Amps)	30A per Leg	30A per Leg
Transfer Time	16 msec	16 msec
Charge Rate (Amps)	105A Max (@28.2V)	60A Max (@56.4V)
AC Input Current for Max Charge Rate Output @ 240 VAC	15 Amps	17.5 Amps
Charger Efficiency	85%	85%
Weight (Lbs)	54.5	54.5
Dimensions (HxWxL)	13.75"x12.65"x8.0"	
Mounting:	Wall or Shelf	

Magnum MS4024AE mounted on a MidNite Solar disconnect with an ME-RC50 Remote Control and a MidNite Classic 150 Charge Controller. See pg 24 for another mounted view.



MAGNUM POWER INVERTERS

Magnum 120 VAC Inverters True Sine Wave @ 12 & 24 VDC

747-2012	MS2012 2000W 12VDC	\$2149
747-2812	MS2812 2800W 12VDC	\$2399
747-2024	MS2024 2000W 24VDC	\$2099
747-4024	MS4024 4000W 24VDC	\$2599

The MS Series Inverter/Charger from Magnum Energy is a pure sine-wave inverter designed specifically for the most demanding renewable energy applications. It is similar in every respect to the MS-PAE Series except it only outputs 120 VAC rather than 120/240 VAC. The MS Series inverter/charger uses the same ME-ARC50 control and ME-AGS-N auto gen start as the MS-PAE Series. The physical size of all the MS and MS-PAE inverters is the same as well, though the weights differ.

Magnum 120 VAC Inverters Modified Sine Wave @ 12 & 24V

The MM-AE and RD 120VAC Series Inverter/Chargers from Magnum Energy are modified sine-wave units designed specifically for off-grid renewable energy applications. The MM-AE and RD Series are powerful, easy-to-use, and best of all, cost effective.

747-0612	MM612AE 600W 12VDC	\$599
747-1512	MM1512AE 1500W 12VDC	\$899
747-1524	MM1524AE 1500W 24VDC	\$939
747-2212	RD2212 2200W 12VDC	\$1459
747-1824	RD1824 1800W 24VDC	\$1289
747-2824	RD2824 2800W 24VDC	\$1679
747-3924	RD3924 3900W 24VDC	\$1979

Magnum MS Series Specifications:

MODEL	MS2012	MS2024	MS2812	MS4024
Continuous Power (Watts)	2000	2000	2800	4000
Max. AC Surge Current (Watts)	3300	2850	3900	5800
Peak Efficiency	90%	86%	90%	93.7%
Search Mode Power	7 Watts	7 Watts	7 Watts	7 Watts
Search Mode Defeated (No Load)	25 Watts	25 Watts	30 Watts	25 Watts
Input Voltage Range (VDC)	9-17	18-34	9-17	9-17
Waveform Sine Wave	Yes	Yes	Yes	Yes
Output Voltage (VAC)	120	120	120	120
Adj. Load Sensing (Watts- Adj.)	5-50	5-50	5-50	5-50
Low Batt Protection (VDC-Out/In)	9 (adj) Out 12.5 In	18 (adj) Out 25 In	9 (adj) Out 12.5 In	18 (adj) Out 25 In
Forced Air Cooling:		0-120 cfm Variable Fans		
Automatic Transfer Relay (Amps)		2 Legs @ 30A		
Transfer Time	16 msecs	16 msecs	16 msecs	16 msecs
Charge Rate (Amps)	100A Max	60A Max	125A Max	105A Max
AC Input Current for Max Charge				
Rate Output @ 120 VAC	15 A	15.8 A	18 A	29 A
Charger Efficiency	85%	85%	85%	85%
AC Input Frequency range		50 to 70 Hz		
AC Input Voltage Range		60 to 140 (120 VAC Nominal)		
Weight (Lbs)	42	41	55	55
Dimensions (HxWxL)	13.75"x12.65"x8.0"			
Mounting:	Wall or Shelf			

Magnum RD Series Specifications:

MODEL	RD2212	RD1824	RD2824	RD3924
Continuous Power (Watts)	2200	1800	2800	3900
Max. AC Surge Current (Watts)	3700	4000	6000	9000
Peak Efficiency	95%	94%	93%	93%
Search Mode Power (typical)	5 Watts	5 Watts	5 Watts	5 Watts
Search Mode Defeated (No Load)	20 Watts	12 Watts	19 Watts	25 Watts
Input Voltage Range (VDC)	9 to 16	18 to 32	18 to 32	18 to 32
Waveform		Modified Sine wave		
Output Voltage (VAC)		120 VAC		
Adj. Load Sensing (Watts)		5-50		
Auto Low Batt Protection (VDC)	9-12.2	18-24.4	18-24.4	18-24.4
Forced Air Cooling:		0-120 cfm Dual Variable Speed Fans		
Automatic Transfer Relay	30A	30A	30A	30A
Transfer Time	16 msecs	16 msecs	16 msecs	6msecs
Charge Rate (Amps)	110A Max	50A Max	80A Max	105A Max
Charger Efficiency	85%	85%	85%	92%
Weight (Lbs)	37	35	42	53
Dimensions (H x W x D)		13.75" x 12.65" x 8"		
Mounting:		Wall or Shelf		

Magnum MM-AE Series Specifications:

MODEL	MM612AE	MM1512AE	MM1524AE
Continuous Power (Watts)	600	1500	1500
Max. AC Surge Current (Watts)	1100	2100	2650
Peak Efficiency	95%	95%	91%
Search Mode Power (typical)	3 Watts	6 Watts	4 Watts
Search Mode Defeated (No Load)	10 Watts	18 Watts	9 Watts
Input Voltage Range (VDC)	9 to 16	9 to 16	18 to 32
Waveform		Modified Sine wave	
Output Voltage (VAC)		120 VAC	
Adj. Load Sensing (Watts)		5-50	
Auto Low Batt Protection (VDC)	9-12.2	9-12.2	18-24.4
Forced Air Cooling:		0-59 cfm Variable Fan	
Automatic Transfer Relay	20A	20A	20A
Transfer Time	16 msecs	16 msecs	16 msecs
Charge Rate (Amps)	30A Max	70A Max	35A Max
Charger Efficiency	85%	88%	88%
Weight (Lbs)	16	22	22
Dimensions (L x W x H)		16.6" x 8.4" x 4.7"	
Mounting:		Wall or Shelf	



Magnum RD 2212
Inverter/Charger



Magnum MM 1512 AE
Inverter/Charger

OUTBACK POWER INVERTERS

OutBack Power Systems is an engineer-owned, customer focused manufacturer of renewable energy systems equipment. Their engineers have decades of power conversion design and equipment installation experience and share a passion for leading the industry into a new era of power conversion equipment performance, ease of use, and standardization.

They have designed all their equipment around an integrated systems approach. One could use an Outback inverter as a stand-alone unit, but its really designed to fit together with all the other pieces of the system.

There are two types of OutBack inverters: the original sealed FX Series and the vented VFX Series. In the sealed FX version all components are cooled by heat transfer. The vented VFX versions are cooled by internal fans. The vented versions allow for higher power inverters to be enclosed in the same size box as the sealed versions.



OutBack Power Inverters and System Components

FX Series Sealed Inverters

745-2012	FX2012T 2000W 12V	\$2369
745-2524	FX2524T 2500W 24V	\$2369
745-3048	FX3048T 3000W 48V	\$2369

VFX Series Vented Inverters

745-2812	VFX2812 2800W 12V	\$2569
745-3524	VFX3524 3500W 24V	\$2569
745-3648	VFX3648 3600W 48V	\$2569



FX/VFX Inverter
(Without Cover)

Design Features

- Powder-coated All Aluminum Die-cast Chassis
- Expandable
- Compact Size
- Field Repairable
- Modular
- 12, 24 and 48 Volt Models

OutBack Inverter Accessories

746-001	Mate	\$295
746-002	Mate2 (Black square housing)	\$295

The OutBack MATE is a complete system controller and display for all combinations of OutBack equipment. It provides a display of the operating parameters:

voltage, current and frequency, as well as providing a means for set-point adjustment. A single MATE can be connected to multiple inverters and MX-60 charge controllers and any future OutBack equipment as well.



746-009	Hub-4	\$195
Four device connection for MATE		
735-001	RTS Remote Temp Sensor	\$29
746-012	PSX-240 Trans w/Enclosure	\$539



PSX-240
Transformer

Performance Features:

- True Sinewave Output
- Low Output Signal Distortion
- Over 3 Times Surge Capacity
- 60A AC Transfer Switch
- Low Idle Power Consumption
- Super Efficient
- Five Stage Smart Charger
- Series Stackable
 - Parallel Stackable
- Three Phase Stackable



OutBack/ MidNite Pre-Wired System Panel with Door Closed

OutBack Inverter Specifications:

	Sealed Versions (Turbo)			Vented Versions		
MODEL	FX2012T	FX2524T	FX2548T	VFX2812	VFX3524	VFX3648
Continuous Power (Watts)	2000	2500	2500	2800	3500	3600
DC Input Voltage (Nom VDC)	12	24	48	12	24	48
(Range VDC)	10.5-17.5	21-34	42-68	10.5-17.5	21-34	42-68
Continuous AC RMS Output	17A	17A	21A	23.3A	29.2A	30A
Surge Power (Peak A@1msec)	56	70	70	56	70	70
(Peak A@100msec)	40	50	50	40	50	50
AC Overload Capability-Watts	4800	6000	6000	4800	6000	6000
5 Sec Watts	4000	4800	4800	4000	5000	5000
30 Min Watts	2500	3200	3200	3200	4000	4000
Efficiency (%)	90	92	93	90	92	93
Idle Power(W) (Sleep-3 Watts)	18-20	18-20	21-23	19-21	18-20	21-23
Automatic AC Transfer Relay	60A	60A	60A	60A	60A	60A
Adj. Charge Rate (Amps)	0-80	0-55	0-35	0-125	0-85	0-45
Minimum DC Breaker (Amps)	250	175	100	250	250	175
Weight (Lbs)	56	56	56	54	54	54
Dimensions (HxWxL)	13" x 8.25" x 16.25"			12" x 8.25" x 16.25"		

SAMLEX POWER INVERTERS

PST Series Sine Wave Inverters

748-001P	PST-300-12 300W 12V	\$159
748-002P	PST-600-12 600W 12V	\$229
748-003P	PST-1000-12 1000W 12V	\$419
748-004P	PST-1500-12 1500W 12V	\$529
748-009P	PST-2000-12 2000W 12V	\$699
748-005P	PST-300-24 300W 24V	\$169
748-006P	PST-600-24 600 24V	\$249
748-007P	PST-1000-24 1000W 24V	\$429
748-008P	PST-1500-24 1500W 24V	\$549
748-010P	PST-2000-24 2000W 24V	\$709

The Samlex PST series Sine wave inverters are low cost while maintaining high quality. They are well suited for small to medium loads where an integrated battery charger is not needed. Consider using a PST series inverter for that one "problem" load or when a "high-power" sine wave inverter with integral battery charger is not needed. An excellent value able to power any load within its power range.



Samlex PST 600W 12V Inverter

Samlex PST Series Sine Wave Inverter Specifications:

MODEL (Watts 12V and 24V)	300 12/24V	600 12/24V	1000 12/24V	1500 12/24V	2000 12/24
Continuous Power (Watts)	300	600	1000	1500	2000
Max. AC Surge Current (VA)	500	1000	2000	3000	4000
Peak Efficiency	85%	85%	85%	85%	85%
No Load Power (Watts)	8.4/9.6	10.2/10.8	9.6/12	<12/<19	<12/<19
Input Voltage Range (VDC)	10.5 -16.5/ 21-33	10.7 -16.5/ 21.4-33	10.7 -16.5/ 21.4-33	10.7-16.5/ 21.4-33	10.7-16.5/ 21.4-33
Output Voltage (VAC)	120	120	120	120	120
Low Input Voltage Shut-Down (VDC)	10/20	10/20	10/20	10/20	10/20
High Input Voltage Shutdown (VDC)	16.5/33	16.5/33	16.5/33	16.5/33	16.5/33
Forced Air Cooling:	Temperature Controlled Fan				
Remote (Optional)	-	RC-15	RC-15	RC-200	RC-200
Weight (Lbs)	3.3	5.4	8.8	12.7	15.6
Dimensions (HxWxL In.)	8.5x5.8x2.6	11x9.3x3.3	15.6x9.3x3.3	16.3x11x3.9	18.43x10.35x4.16
Mounting:	Wall or Shelf				

SA Series Sine Wave Inverters

748-011S	SA-300-112 300W 12V	\$189
748-012S	SA-600R-112 600W 12V	\$349
748-013S	SA-1000K-112 1000W 12V	\$429
748-014S	SA-1500-112 1500W 12V	\$559
748-014S	SA-2000K-112 2000W 12V	\$859
748-014S	SA-3000K-112 3000W 12V	\$1269
748-017S	SA-300-124 300W 24V	\$189
748-018S	SA-600R-124 600 24V	\$349
748-019S	SA-1000K-124 1000W 24V	\$429
748-020S	SA-1500-124 1500W 24V	\$559
748-014S	SA-2000K-124 2000W 24V	\$859
748-014S	SA-3000K-124 3000W 24V	\$1269

The SA Series are much the same as the PST Series, but are more robust.



Samlex SA 600W Inverter

Samlex SA Series Sine Wave Inverter Specifications:

MODEL (Watts 12v and 24V)	300 12/24V	600 12/24V	1000 12/24V	1500 12/24V	2000 12/24V	3000 12/24V
Continuous Power (Watts)	300	600	1000	1500	2000	3000
Max. AC Surge Current (VA)	400	800	2000	2000	4000	6000
Peak Efficiency	89%	87%	89%	87%	89%/92%	88%/91%
No Load Power (Watts)	3/7	17/18	17/18	11/11	33.6/36	24/38.4
Stand-By Power	3/4	3/4	3/4	3/4	7.2/7.2	6.6/8.4
Input Voltage Range (VDC)	10.5 -15/ 21-30	10.5 -15/ 21-30	10.5 -15.0/ 21-30	11 -16/ 22 -32	10.5-15.0/ 21.0-30.0	10.5-15.0/ 21.0-30.0
Output Voltage (VAC)	120	120	120	120	120	120
Low Input Voltage Shut-Down (VDC)	10/20	10.5/21	10.5/21	10.5/21	10.5/21	10.5/21
High Input Voltage Shutdown (VDC)	15.5/31	15.3/30.6	15.3/30.6	15.3/30.6	15.3/30.6	15.3/30.6
Forced Air Cooling:	Temperature Controlled Fan					
Remote (Optional)	Ex. Switch	Ex. Switch	S-R6-12/24,S-R8	SR-5	S-R6-12/24,S-R8	S-R6-12/24,S-R8
Weight (Lbs)	7.7	5.4	8.8	15.5	19.8	22
Dimensions (LxWxH In.)	9.5x6x3	12.25x7.0x2.75	15.5x7.0x3.5	16.0x11.0x4.0	15.5x8.25x6.25	17.25x8.25x6.75
Mounting:	Wall or Shelf					

SCHNEIDER (XANTREX) INVERTERS

Xantrex inverters are the best and most popular inverter on the market because of their high efficiency and high reliability. This makes them ideal for all types of home-owner use from starting and running a submersible pump to operating a few lights and the TV. Reliability is where Xantrex inverters really set themselves apart. They are designed to protect themselves from every possible abuse—high and low battery bank voltage, high operating temperature, and shorted output. All this means that the user doesn't have to worry about inadvertently damaging their inverter. We have been selling Xantrex inverters for more than 15 years. The number of failures reported back to us has been phenomenally low—much less than 1%. Its nice to sell a product that delivers years of trouble-free service. It means less problems for us and most importantly—less problems for you!



XW Model Inverter

New Xantrex XW Inverters



XW System: XW Inverter, XW Power Distribution Panel and XW60 Charge Controller

Xantrex has introduced a new line of inverters called the XW Hybrid Inverter/Charger. This family of true sine wave inverters does it all - 120/240 VAC, stand-alone, grid backup and grid-tie - in one inverter. In one beautifully designed package, with a pre-wired AC/DC disconnect, all your inverter needs are met. Sizes include 6kW and 4.5 kW 48VDC units and a 4 kW 24 VDC unit.

Xantrex XW Model Inverters

740-001	XW4024 4000W 24V	\$3950
740-002	XW4548 4500W 48V	\$3950
740-003	XW6048 6000W 48V	\$4650

Key Features:

- 5 Year Warranty
- 120/240-volt split-phase, true sine wave output (no need for autotransformer or stacking inverters)
- Unsurpassed surge capacity - innovative Full Digital Control regulates voltage to prevent a drop during a power surge.
 - Full 200% rated output power is delivered to the load
 - Efficient, power factor corrected, high-current, multistage battery charging (minimizes recharge time, and electricity/fuel costs, and prolongs battery life)
 - Battery temperature Sensor Included
 - Certified to UL1741 and CSA for utility-interactive applications (no need to purchase an application specific model)
 - Easier and less expensive to install - mounting bracket is included and Power Distribution Panel includes all AC/DC disconnects and wiring (no need to individually purchase separate components)
 - Local display on inverter shows output power, charge current and battery level, to provide system status at-a-glance
 - Xanbus™ Network provides plug-and-play networkability (no need for separate hub or router)

XW System Accessories:

XW System Control with LCD Display:

741-011 XW System Control \$300

The XW System Control Panel features a graphical, backlit LCD display that provides system configuration and diagnostic information. The control unit is connected to the XW system components (XW inverter(s), XW charge controller(s) and auto generator start module) using Cat 5 cable in the Xanbus™ enabled network. No other connection devices are required except for the cat 5 cable between each component.



XW Automatic Generator Start:

741-012 Automatic Generator Start \$200



This module automatically activates a generator to provide the power to the XW inverter to charge a depleted battery bank. The user can define whether the generator should be activated on low battery bank voltage, state-of-charge, or load on the inverters. The AGS can start both two and three wire start controls.

XW Power Distribution Panel

741-010 Power Distribution Panel \$1800

Prewired for both AC and DC disconnects, it contains AC bypass breakers and a 250A inverter breaker. It is used on all three inverter models. Extra breakers can be added both for DC disconnects (XW charge controller, etc.) and AC circuits, including a generator AC input. We feel that it is necessary to use this distribution panel with any XW inverter installation and of course it is a necessary item for a code installation. The wire is cut-to-length, ready to connect to the inverter. Includes mounting plate and one XW conduit box.



SCHNEIDER (XANTREX) INVERTERS

XW System Accessories:

XW Conduit Box

741-015 XW Conduit Box

\$175

Only necessary for multiple inverter installations.



XW DC Panel Mount Circuit Breakers

741-019 15A \$35

741-018 20A \$35

741-017 30A \$35

741-014 60A \$25

741-020 80A \$35

Use for XW60 charge controller disconnects or any other DC load circuits.



XW AC Panel Mount Circuit Breakers

343-5xx AC Circuit Breakers Single Pole 15,20,30,40,60 Amps \$15

343-6xx AC Circuit Breaker Double Pole 30 or 60 Amps \$40

DIN Rail mount AC circuit breakers for load disconnect on XW inverter systems.



XW Pre-Wired System including XW60 charge controller, inverter cables and lightning arrestors.

XW 4024 System:

Input: 24 VDC Battery Bank

Output: 120/240 VAC Sine Wave

Charger: 150 amps at 24 VDC

Max. Array Input: 60 amps at 24VDC



740-001	Xantrex XW 4024 Inverter	\$3950.00
741-010	XW DC Disconnect	1800.00
741-012	XW Control Panel	300.00
730-061	Xantrex XW60 Charge Cont.	685.00
741-015	Two XW 60A Breakers	50.00
312-4010	10' 4/0 Inverter Cables	219.00
757-020	Two MidNiteDC Lightning Arrestors	238.00

Total: \$7242.00

Special Kit Price: \$6069

Xantrex XW Series Sine Wave Inverter Specifications:

MODEL	XW4024	XW4548	XW6048
Power Output			
Continuous Power:	4000 watts	4500 watts	6000 watts
Output Current AC Amps:	L-L: 16.7 A	L-L: 18.8 A	L-L: 25 A
Surge Capability:			
10 second rating	8000 W	9000 W	12,000 W
Weighted Efficiency:	91%	93%	93.5%
Transfer Relay:	60 Amps rms	60 Amps rms	60 Amps rms

Battery Charger

Multi-Stage Charging:	Bulk, absorption, float/silent, and equalize		
Maximum Charge Rate:	150 amps DC	85 amps DC	100 amps DC
AC Input Current:	L-L: 18.3 A	L-L: 20.6 A	L-L: 27.5 A
Bulk Voltage (default):	28.8 VDC	57.6 VDC	57.6 VDC
Float Voltage (default):	26.8 VDC	53.6 VDC	53.6 VDC
Absorption Time (default):	2 hours	2 hours	2 hours

DC Input Requirements

Search Mode:	<8 watts	<8 watts	<8 watts
On Mode (no load):	24 watts	26 watts	28 watts
At Full Rated Power:	171 amps	95 amps	127 amps
DC Input Voltage (Nominal)	25.2 VDC	50.4 VDC	50.4 VDC
DC Input Voltage Range:	22 to 32 VDC	44 to 64 VDC	44 to 64 VDC

AC Output Characteristics

Output Voltage:	L-n: 120 VAC +/- 3%	L-L: 240 VAC +/- 3%
AC Waveform:	True Sine Wave	
Frequency Regulation:	60 Hz +/- 0.1%	
Load Sensing:	8 to 255 watts (8 watts default)	
Listings:	UL 1741 1st Edition 2005; CSA107.1-01; FCC Class B	

Standard Features

Adjustable Low Battery Protection
 BTS— standard remote battery temperature sensor
 Auxiliary Relay Output - 0-12 VDC, maximum 250 mA DC

Options

XW System Control Panel
 XW Power Distribution Panel
 XW Conduit Wiring Box for AC & DC Connections
 XW Automatic Generator Start

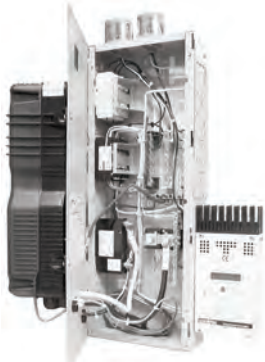
Physical

Enclosure	NEMA Type 1 - Indoor		
Specified Temp Range:	32°F to 104°F		
Allowed Temp Range:	-13°F to 158°F		
Weight:	115 lbs	115 lbs	125 lbs
Dimensions	23" H x 16" W x 9" D		
Dimensions with Power Distribution Panel:	30" H x 32" W x 9" D		
Mounting:	Wall		

NESE PRE-WIRED POWER PANEL SYSTEMS

Prewired Inverter/ Charge Controller Systems

This is the easiest, quickest and least expensive way to get a Magnum, OutBack or Xantrex prewired system. We wire the charge controller/ disconnect parts for you. All you have to do is mount the inverter and prewired equipment on a plywood board and hook up the inverter/battery cables and the array wires. All equipment is certified to UL standards.



MM1512AE System:
 Input: 12 VDC Battery Bank
 Output: 120 VAC Modified Sine wave
 Charger: 70 amps at 12 VDC
 Max. Array Input: 40 amps at 12VDC

MM1512AE and C40/CM attached to MidNite Solar disconnect, shown with door open.

Note: This system can be configured for a 24VDC battery bank featuring an MM1524 inverter for \$2179

747-1512	Magnum MM1512AE Inverter	\$899.00
747-006	Magnum MN-ARC50 Control	299.00
757-005	MidNite MNE125STMM-L Disconnect	529.00
757-009	MidNite MNDC-GFP Gnd Fault Protector	69.00
343-040	2 MidNite MNEPV 40A Circuit Breakers	30.00
730-040	Trace C40 Charge Cont.	159.00
730-041	C40 Digital Volt Meter	99.00
312-3010	10' 2/0 Inverter Cables	139.00
757-020	2 MidNite Lightning Arrestors	238.00
Total:		\$2461.00
Special Kit Price:		\$2199



RD2212 System
 Input: 12 VDC Battery Bank
 Output: 120 VAC Modified Sine wave
 Charger: 110 amps at 12 VDC
 Max. Array Input: 40 amps at 12VDC

RD2212 and C40/CM attached to MidNite Solar disconnect, shown with door open.

Note: This system can be configured for a 24VDC battery bank featuring an RD2824 inverter for \$2909

747-2212	Magnum RD2212 Inverter	\$1459.00
747-006	Magnum MN-ARC50 Control	299.00
757-005	MidNite MNE250STM-L Disconnect	619.00
757-009	MidNite MNDC-GFP Gnd Fault Protector	69.00
343-040	2 MidNite MNEPV 40A Circuit Breakers	30.00
730-040	Trace C40 Charge Cont.	159.00
730-041	C40 Digital Volt Meter	99.00
312-3010	10' 2/0 Inverter Cables	139.00
757-020	2 MidNite Lightning Arrestors	238.00
Total:		\$3111.00
Special Kit Price:		\$2739



OutBack VFX2812 System:
 Input: 12 VDC Battery Bank
 Output: 120 VAC Sine wave
 Charger: 125 amps at 12 VDC
 Max. Array Input: 60 amps at 12VDC or 30 amps at 24VDC

VFX2812 and FM60 attached to MidNite Solar disconnect, shown with door closed.

745-2812	OutBack VFX2812 Inverter	\$2569.00
746-001	OutBack MATE Controller	295.00
757-002	MidNite MNE250STS-L Disconnect	619.00
757-009	MidNite MNDC-GFP Gnd Fault Protector	69.00
343-063	2 MidNite MNEPV 63A Circuit Breakers	30.00
735-060	OutBack FM60 Charge Cont.	749.00
312-2010	10' 4/0 Inverter Cables	219.00
757-020	2 MidNite Lightning Arrestors	238.00
Total:		\$4788.00
Special Kit Price:		\$4069



OutBack VFX3524 System:
 Input: 24 VDC Battery Bank
 Output: 120 VAC Sine wave
 Charger: 85 amps at 24 VDC
 Max. Array Input: 60 amps at 24VDC or 30 amps at 48VDC

VFX3524 and FM60 attached to MidNite Solar disconnect, shown with door open..

Note: This system can be configured for a 48VDC battery bank featuring an OutBack VFX3648 inverter for \$3989

745-3524	OutBack VFX3524 Inverter	\$2569.00
746-001	OutBack MATE Controller	295.00
757-002	MidNite MNE250STS-L Disconnect	619.00
757-009	MidNite MNDC-GFP Gnd Fault Protector	69.00
343-063	2 MidNite MNEPV 63A Circuit Breakers	30.00
735-060	OutBack FM60 Charge Cont.	749.00
312-2010	10' 4/0 Inverter Cables	219.00
757-020	2 MidNite Lightning Arrestors	238.00
Total:		\$4788.00
Special Kit Price:		\$4069

NESE PRE-WIRED POWER PANEL SYSTEMS

Magnum 120VAC System:
 Input: 12 VDC Battery Bank
 Output: 120VAC Sinewave
 Charger: 100 amps at 12 VDC
 Max. Array Input: 40 amps at 12VDC



MS2012 and C40/CM attached to MidNite Solar disconnect, shown with door closed.

Note: This system can be configured for a 24VDC battery bank featuring an MS2024 inverter for \$3199

747-2012	Magnum MS2012 Inverter	\$2149.00
747-006	Magnum ME-ARC50 Remote Control	299.00
757-016	MidNite MNE175STM-L Disconnect	619.00
730-040	Xantrex C40 Charge Controller	159.00
730-041	Xantrex CM Mater Set	99.00
757-009	MidNite MNDC-GFP Gnd Fault Protector	69.00
343-040	2 MidNite MNEPV 40A DC Breakers	30.00
312-2010	10' 2/0 Invert Cables	139.00
757-020	2 MidNite Lightning Arrestors	238.00
Total:		\$3801.00
Special Kit Price:		\$3209

Magnum 120VAC System:
 Input: 24 VDC Battery Bank
 Output: 120 VAC Sinewave
 Charger: 105 amps at 24 VDC
 Max. Array Input: 80 amps at 24VDC or
 40 amps at 48VDC



MS4024 and Classic 150 attached to MidNite Solar disconnect, shown with door open.

747-4024	Magnum MS4024 Inverter	\$2599.00
747-006	Magnum ME-ARC50 Remote Control	299.00
757-016	MidNite MNE250STM-L Disconnect	619.00
757-110	MidNite Classic 150 Charge Controller	850.00
746-080	2 MidNite MNEDC 80A DC Breakers	50.00
312-2010	10' 4/0 Invert Cables	219.00
757-020	2 MidNite Lightning Arrestors	238.00
Total:		\$4874.00
Special Kit Price:		\$4129

Magnum 240/120VAC System:
 Input: 24 VDC Battery Bank
 Output: 120/240 VAC Sinewave
 Charger: 105 amps at 24 VDC
 Max. Array Input: 60 amps at 24VDC or
 30 amps at 48VDC



MS4024PAE and Classic 150 attached to MidNite Solar disconnect, shown with door closed.

Note: This system can be configured for a 48VDC battery bank featuring an MS4448PAE inverter for \$4299

747-001	Magnum MS4024PAE Inverter	\$2699.00
747-006	Magnum ME-ARC50 Remote Control	299.00
757-001	MidNite MNE250STM-L-240 Disconnect	799.00
757-110	Classic 150 Charge Controller	850.00
746-080	2 MidNite MNEDC 80A DC Breakers	50.00
312-4010	10' 4/0 Invert Cables	219.00
757-020	2 MidNite Lightning Arrestors	238.00
Total:		\$5154.00
Special Kit Price:		\$4389

XW 4024 System:
 Input: 24 VDC Battery Bank
 Output: 120/240 VAC Sine Wave
 Charger: 150 amps at 24 VDC
 Max. Array Input: 60 amps at 24VDC

Note: This system can be configured for a 48VDC battery bank featuring an XW4548 inverter for \$6069 or an XW6048 for \$6639



740-001	Xantrex XW 4024 Inverter	\$3950.00
741-010	XW DC Disconnect	1800.00
741-012	XW Control Panel	300.00
730-061	Xantrex XW60 Charge Cont.	685.00
741-015	Two XW 60A Breakers	50.00
312-4010	10' 4/0 Invert Cables	219.00
757-020	Two MidNiteDC Lightning Arrestors	238.00
Total:		\$7242.00
Special Kit Price:		\$6069

INVERTER CABLES AND DISCONNECTS

INVERTER CABLE NOTES

Your inverter cables should be sized long enough to "cross-corner" wire to your battery bank. This means the positive and negative inverter leads should be attached to the bank at opposite ends or corners, not at the same end. (See any of the kit diagrams on pages 8 to 25.) The inverter cables should also be of equal length even though it seems that cross corner wiring would force one cable to be much longer than the other. The cables should be taped together in a parallel fashion as far as possible before breaking towards their respective corners.

Once the length is determined, it is imperative that the cables be the right gauge. Inverter manufacturers would like zero voltage drop at the input of their inverters. While this is impossible, the voltage drop must be limited to less than 2%. It may seem that the sizes of the inverter cables are extreme. However, this is what is required for proper inverter operation.

Inverter Cables

These inverter cables are made from high quality battery cable and are sold in pairs. Ring terminals with 5/16" diameter holes are crimped on each end using a professional crimping tool which results in a gas-tight connection. The crimps are covered with glue-sealing heat shrink tubing—Red for the Positive cable and Black for the Negative cable. Consult the chart below for the correct gage cable according to inverter size and length of cable needed.

Number	Gage/Length	Price	>5' + /Ft.
312-045	4 Ga 5' Pair	\$43	\$6.00
312-0410	4 Ga 10' Pair	\$65	
312-025	2 Ga 5' Pair	\$49	\$7.00
312-0210	2 Ga 10' Pair	\$89	
312-205	2/0 Ga 5' Pair	\$79	12.00
312-2010	2/0 Ga 10' Pair	\$139	
312-405	4/0 Ga 5' Pair	\$119	\$20.00
312-4010	4/0 Ga 10' Pair	\$219	

Class T Fuse & Fuse Block

355-001	110A Class T Fuse & Fuse Block	\$69
355-002	200A Class T Fuse & Fuse Block	\$69
355-004	300A Class T Fuse & Fuse Block	\$83

The Class T Fuse Block reliably protects high amperage components from overloads and short circuit damage. It utilizes a Class T fuse which provides the highest amps of interrupting capacity (AIC) of any comparable fuse or breaker. The Class T-Fuse Block is designed with protective cover and base to meet the installation requirements of the National Electrical Code.



Replacement Class T Fuses

346-110	110A Class T fuse	\$26
346-200	200A Class T fuse	\$26
346-300	300A Class T fuse	\$45

AMPACITY of COPPER WIRE @ 75° C		
Wire Gauge	In Conduit	In Free Air
14 AWG	15 amps	20 amps
12 AWG	20 amps	25 amps
10 AWG	30 amps	40 amps
8 AWG	45 amps	65 amps
6 AWG	65 amps	95 amps
4 AWG	85 amps	125 amps
2 AWG	115 amps	170 amps
1/0 AWG	150 amps	230 amps
2/0 AWG	175 amps	265 amps
3/0 AWG	200 amps	310 amps
4/0 AWG	230 amps	360 amps

Manual Transfer Switch

753-101 MNTransfer - 240VAC

\$139

This switch, mounted in a Big Baby Box, consists of two 60A two-pole breakers interlocked such that either a generator or the power lines could supply an inverter with power to charge the battery bank. The inverter would be connected to a sub-panel for backed-up loads. This switch comes with a neutral bus bar and ground box terminal. Wiring diagrams are supplied.



Size: 8"H x 5"W x 3.5"D

(This is not a by-pass switch. This box can be converted to act as 120VAC (only) by-pass switch. See below.)

Inverter Bypass Box

753-102 Inverter Bypass Box-120VAC \$139

An inverter bypass box is used to let the generator bypass the inverter and directly feed the AC distribution panel. The box consists of two dual circuit 60A breakers and a special interlock which forces one breaker to be in the "off" position when its mate is "on" and vice-versa. In the on position the generator current flows through the inverter, charging the battery bank and powering the AC loads. In the by-pass position the generator current flows directly to the AC distribution panel and the inverter is completely out of the circuit. This is useful for testing purposes, or for when the inverter must be removed from the system. The box is prewired and can handle up to 60 amps.

Inverter Disconnect and Cable Size					
Inverter Model	Breaker Size	Class "T" Fuse	Minimum Cable Gauge (in free air)		
			<5'	5'-10'	11'-20'
1500W 12V	175 A	200 A	2/0 Ga	2/0 Ga.	4/0 Ga.
2000W 12V	250A	300A	2/0 Ga,	4/0 Ga.	N/R
2800W 12V	250 A	300 A	4/0 Ga.	4/0 Ga.	N/R
1500W 24V	175 A	110 A	2 Ga	2 Ga.	2/0 Ga.
2000W 24V	175 A	110 A	4 Ga	2 Ga.	2/0 Ga.
2400W 24V	175 A	200 A	2/0 Ga.	2/0 Ga.	4/0 Ga.
3600W 24V	250 A	300 A	4/0 Ga.	4/0 Ga.	4/0 Ga.
4000W 24V	250 A	300 A	2/0 Ga.	4/0 Ga.	4/0 Ga.
4500W 48V	175 A	200 A	2/0 Ga.	2/0 Ga.	4/0 Ga.
6000W 48V	250 A	300 A	4/0 Ga.	4/0 Ga.	4/0 Ga.

INVERTER CABLES AND DISCONNECTS

MidNite Solar E-Panels

757-001	For Magnum PAE Inverters MNE175/250STM-L-240	\$799
757-016	For Magnum MS Inverters MNE175/250STM-L	\$619
757-016	For Magnum RD Inverters MNE175/250STM-L	\$619
757-003	For Magnum MM Inverters MNE125STMM-L	\$529
757-002	For OutBack VFX Inverters MNE175/250STS-L	\$619
757-010	For Xantrex XW Inverters MNE250XW	\$950
757-004	Mini Disconnect MNDC175/250	\$250

MidNite Solar has a full line AC/DC disconnects for all brands of inverters and charge controllers. We now feature these disconnects in almost all of our kits.

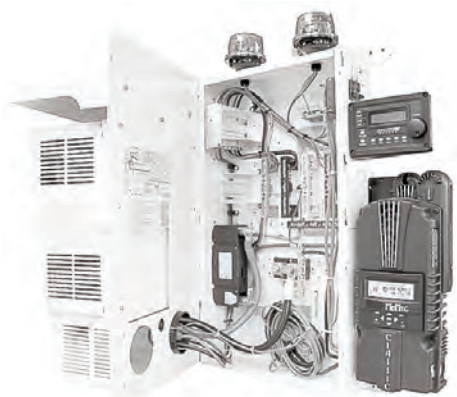
The E-Panels include AC bypass and AC input disconnect breakers pre-wired to terminals strips for easy AC wiring installation. There is room for 6 additional AC or DC din rail mounted breakers and 3 to 4 DC panel mount breakers. The main inverter breaker (175A or 250A) is installed with positive and negative inverter cables from the disconnect to the inverter. (Cables to the battery bank are extra.) Also included is a 500amp/50mv shunt with negative bus bar attached, a battery plus bus bar, a PV array bus bar, AC bus bars, a ground bus bar, and lots of hardware for mounting and wiring charge controllers to the disconnect. Wall mounting brackets and complete illustrated instructions complete the package.

The boxes are made of powder coated steel or in some cases, powder coated aluminum.

E-Panels are by far the nicest, easiest-to-use disconnects in the business.

E-Panel Options

757-006	White Bus Bar	\$17
757-007	Red Bus Bar	\$17
757-008	Black Bus Bar	\$17
343-0xx	DC Din Rail Breakers 10,15,20,30,40,63 Amps 150VDC AIC 10,000	\$15
344-0xx	AC Din Rail Breakers 120VAC 10,15,20,30,40,50,60,Amps AIC 10,000 Hold 100% Rated A	\$17
746-xxx	DC Panel Breakers 150VDC 10,15,20,30,40,650,60,70,80 90 & 100 Amps AIC10,000	\$25
746-125	DC Panel Breaker 125A 125VDC AIC 10,000	\$25
746-175	DC Panel Mount Breaker 175A 125V AIC 10,000	\$109
746-250	DC Panel Mount Breaker 250A 125V AIC 10,000	\$109
757-009	Array Ground Fault Breaker 63A 150VDC DIN-Rail Mount	\$69
757-017	Array Ground Fault Breaker 80A 150VDC Panel Mount	\$89



MidNite E-Panel shown with Magnum MS-PAE Inverter, a Classic 150 Charge Controller and two MidNite MESP300 Lightning Arrestors



Magnum E-Panel



Mini Disconnect

BATTERIES



Trojan batteries are considered the Cadillac of the battery world. They have the standard glass mats and high quality separators found in other high quality batteries. However they have a patented Multi Rib Separator that outperforms the competition. Do not settle for the "or equivalent" listed in some catalogs.

NOTES ON BATTERY MAINTENANCE

Just about the only maintenance required in a solar electric system is to the battery bank. Proper care of your bank will eliminate 99% of all system problems. You will get a one page Battery Care Sheet from us with just about anything you purchase. You will receive our **Battery Book for Your PV Home** with the purchase of a battery bank. In any case, not using more power than you produce is the first secret to battery bank care! People often ask "How many modules do I need to charge my batteries?". The question should be "How many modules do I need to keep up with my energy use?". The definition of a properly sized system is keeping your batteries fully charged all (or at least most of) the time. You'll need a hydrometer and a digital voltmeter to monitor your system. Another very important maintenance procedure is to equalize (overcharge) your wet lead-acid bank periodically - about 4 times a year would be good. (Note that Gel or AGM batteries should NOT be equalized or charged beyond their recommended "full charge" voltage

Trojan T-105

6 volts 225 amp-hrs 62 lbs
720-105 Trojan T105 \$159
(L) 10 3/8 in. (W) 7 1/8 in. (H) 10 7/8 in.



The Trojan T105 battery is a top quality battery with glass mats and patented Multi-Rib separators. The Multi-Rib separator provides superior electrolyte distribution, less negative plate expansion, less water usage, reduced positive plate shedding and less maintenance. They also utilize a proprietary paste formula, known as Alpha Plus, which is another key ingredient to long life. Trojan T-105's are simply the best battery of this type and size. In fact, based on the new Battery Council International testing procedures, Trojan's T-105 was 225 cycles better than the next leading brand.

The T-105 model has a strong, lightweight case, made of polypropylene. It weighs about 62 pounds. It is easier to use as a building block than the 130 pound L-16 battery. One person can carry the T-105 battery.

Don't buy 12 volt marine batteries for your system unless it will have only one battery. Two 6V batteries wired in series make one large 12V battery that is bigger and better than two of the 12V marine batteries.

All of our kits feature Trojan T-105 batteries, and always have for the last twenty years. Many of the systems we sold ten years ago are still operating on the original T-105 battery bank. In terms of watts stored over time per dollar, nothing even approaches the Trojan T-105 for value.

*Please note:
Sales tax will be added
to all T105 and L16
orders delivered to the
New England states.
(Except NH)*

Trojan RE SERIES Batteries

Trojan T105-RE

6 volts 225 amp-hrs 67 lbs
720-106 Trojan T105-RE \$179
(L) 10 5/8 in. (W) 7 1/8 in. (H) 11 3/4 in.

Trojan L16RE-B

6 volts 370 amp-hrs 118 lbs
720-016 Trojan L16RE-B \$359
(L) 11 5/8 in. (W) 7 in. (H) 17 11/16 in.

The Trojan RE Series batteries are tougher deep cycle batteries especially designed for the alternative energy market. If you insist on a more robust, longer life battery for your bank, the Trojan RE Series are an excellent choice.

They have been redesigned and optimized for use in a renewable energy systems. The Dura-Grid™ technology provides a 10-year design life and excellent charge efficiency. The Maxguard™ XL advanced design separator is 30% thicker and stronger, resists stratification, extends life and lowers overall maintenance time. The Alpha Plus™ paste formulation promotes longer life and optimum performance. Both batteries feature an "L" type terminal for easier battery bank connections.

Both batteries feature a two year replacement warranty. (This does NOT cover abuse of the batteries. Trojan has an RE-Series warranty sheet posted on their website.) The T105-RE has an added pro-rated 36 month warranty for a total of a 5-year warranty. The L16-RE has a pro-rated added 60 month warranty for a total 7-year warranty.



T105-RE
Top View



T105-RE
Side View

MK DEKA Gel Battery

12 volts 88 amp-hrs 63 lbs

720-088 8G27-DEKA \$259
(L) 12.83 in (W) 6.56 in (H) 9.30 in

The 8G27 is a valve regulated, gelled-electrolyte, lead acid battery designed specifically for deep cycle applications. This makes an excellent battery for alternative energy use. It also requires almost no maintenance and since it does not gas, the battery bank needs no venting. The 8G27 also has the ability to operate effectively in broad temperature extremes making it a good battery for use in cold locations. Each battery is fitted with "Flag" type terminals that have clearance holes for 1/4" bolts.

Features:

- Completely maintenance free. Sealed construction eliminates periodic watering, corrosive acid fumes and spills.
- Electrolyte will not stratify, no equalization charge required. Allows faster recharge.
- Case and cover of high impact polypropylene with reinforced endwalls to reduce bulging.
- Self-sealing vent for safety and long life.
- Thermally welded polypropylene case-to-cover bond to ensure a leak-proof seal.
- Less than 2% per month stand loss means little deterioration during transport and storage.
- No transportation restrictions.
- UL recognized component.
- Can be used in any orientation. Upright, side or end mounting recommended.
- Float Charge Voltage: 13.8 to 14.1 VDC



Trojan AGM Battery

720-890 Trojan 27AGM Battery \$239
12V, 100 amp-hrs, 67 lbs
(L) 12.56 in (W) 6.81 in (H) 8.70 in

The Trojan AGM battery employs a valve regulated lead acid (VRLA), absorbed glass mat (AGM) design. This series is specifically designed for use in an alternative energy system where cycling is the norm. The batteries are sealed using pressure relief safety valves and hence do not need venting. For those who can afford their extra cost, the 27AGM series is an excellent battery for an alternative energy user or for home backup.

Features:

- Completely sealed valve regulated construction.
 - Immobilized electrolytic. Non-spillable.
 - Maintenance free design. Never requires watering.
 - Non removable pressure regulated, flame arresting safety valves, non-protruding.
 - AGM microporous spun glass separators.
 - Copolymer polypropylene case and cover.
- Wide range of operating temperatures from -40°F to 160°F.
- Low self discharge rate (approx. 1% per month).
 - UL recognized systems component.
 - No transportation restrictions.
 - Built in handles.



Battery Delivery

We ship batteries by common carrier. We get a volume discount from our shipper and pass the savings on to you. The freight must be prepaid and the batteries must be delivered to a business address. This could be where you work or c/o the town general store, garage, or a business where you have a friend who will accept delivery.

Throughout New England the freight charge is \$100 for 1 to 24 T105's. The charge rises to \$120 to \$130 for delivery to New York State depending on quantity.

Appropriate sales tax will be charged on batteries shipped to RI, CT, ME and VT.

Our distributor packs them on a pallet and shrink wraps them for protection during shipping. You remove them individually off the truck if the business site doesn't have a fork lift. Call us for advice.

**See Page 53 for
Pictures of Battery
Boxes**

BATTERY ACCESSORIES

Battery Anticorrosion Rings

- 721-001 For T-105 \$.40
 721-002 For L-16 \$.40

These are a must on any battery bank. You will need one per battery post [two per battery]. The ring for an L-16 is larger to fit over the larger post. These rings go over the post before the cable is bolted on. They lay on top of the battery case around the stud and chemically protect the studs from corrosion. They are not a washer that is attached by the cable lug and nut.



Battery Cables

These cables are made with small strand flexible battery cable. Each end has a copper lug crimped on with a gas-less connection. The crimped portion is then covered with heat-shrink tubing with a glued bond to protect against corrosion.



- | | | |
|---------|----------------------------|---------|
| 311-003 | 12" 2ga. Battery Cable | \$9.00 |
| 311-004 | 18" 2 ga. Battery Cable | \$10.00 |
| 311-005 | 24" 2 ga. Battery Cable | \$12.00 |
| 311-006 | 12" 2/0 ga. Battery Cable | \$12.00 |
| 311-008 | 18" 2/0 ga. Battery Cable | \$15.00 |
| 311-007 | 24" 2/0 ga. Battery Cable | \$18.00 |
| 311-009 | 12" 4/0 ga. Battery cable | \$19.00 |
| 311-010 | 18" 4/0 ga. Battery cables | \$23.00 |
| 311-011 | 24" 4/0 ga. Battery cables | \$28.00 |

Custom Cables

2, 2/0, or 4/0 gauge. Any length.
 Similar pricing as above.

Lead Battery Lug

- 328-003 Universal Post \$3.70

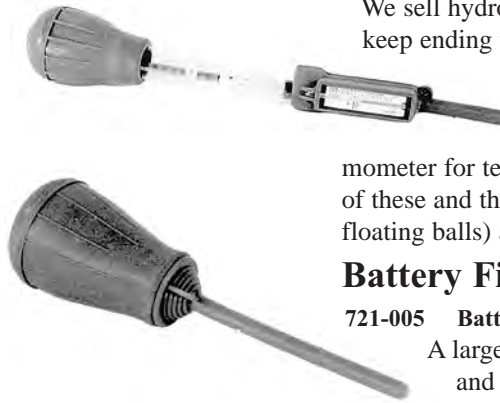
Use these to make secure connections to your batteries if you don't have battery leads with crimped or soldered ring terminals or if your batteries don't have threaded studs. They work on both Pos and Neg posts.



Hydrometer

- 721-004 Hydrometer \$12.95

We sell hydrometers because our customers keep ending up with cheap ones that are grossly inaccurate. These hydrometers have a glass float calibrated with number values and a small thermometer for temperature compensation. Buy one of these and throw the old one (with the four floating balls) away.



Battery Filler Bulb

- 721-005 Battery Filler Bulb \$3.50

A large rubber bulb and shaft for easy and accurate adding of distilled water to batteries.

Battery Filler Tank

- 721-007 Battery Filler \$13.00

We have come across a handy device for "automatically" filling batteries. Just put the filler spout into the battery filler neck and hold it there. The distilled water stops flowing at the correct level automatically. A perfect fill every time. The container holds a little more than 1/2 gallon of distilled water. Very easy to use.



Power Vent

- | | | |
|---------|----------------------------|-------|
| 903-007 | 12 volt | \$79 |
| 903-008 | 24 volt | \$79 |
| 903-009 | 48 volt | \$104 |
| 903-010 | Replacement Fan 12V or 24V | \$24 |

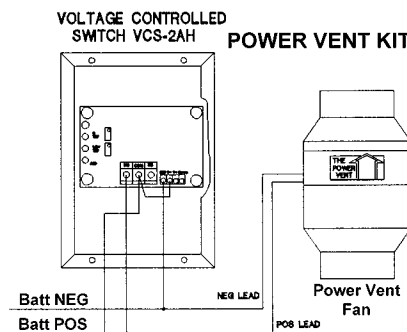
The Power Vent battery box ventilator is the ideal solution for venting your battery bank. It is fitted with a 12v, 24v or 48v fan using only 3 watts (6 watts for the 48v version as it has two fans). The 12 and 24v units use 2" PVC pipe sockets; the 48v version uses a 2" input with a 3" output. All versions have a back-draft damper and must be mounted vertically in an exhaust pipe. Those of you with inverters or charge controllers that have a programmable switch, can use that to switch the vent on and off. Otherwise, you can purchase the Power Vent as part of a battery venting kit using a VCS-2AH for the switch. See below.



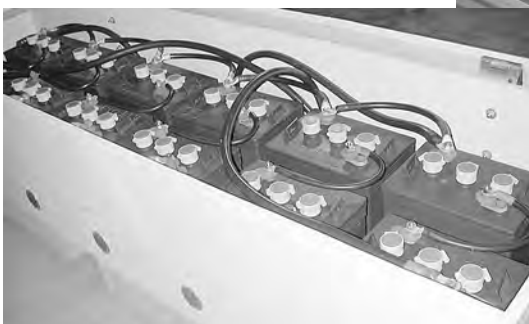
Battery Venting Kit

- | | | |
|---------|---------|-------|
| 722-012 | 12 volt | \$199 |
| 722-024 | 24 volt | \$199 |
| 722-048 | 48 volt | \$225 |

Some people will be able to use a thermosiphoning vent to satisfy the venting requirements for their battery area. For those who have a need for a more positive method, we have a battery venting kit that is composed of a voltage controller and the Power Vent listed above. When the battery bank reaches a voltage level where battery gassing starts, the fan is turned on. When the battery voltage drops below the gassing level, the fan is stopped. Thus the fan is only on when the batteries are gassing, and nearly fully charged. Two inch PVC is used for the vent pipe. We preset the connect and disconnect points for you.



BATTERY BOXES



I took these pictures of various battery box designs while on a trip to Maine a few years back. We spend so much time describing battery box designs, we thought it might help if we included a few examples in our catalog.

First, notice how all but one design have the batteries at waist height. (The one that doesn't is in a crawl space.) This allows you to easily perform maintenance tasks on the bank without killing your back!

Second, all boxes have a lid to keep kids and pets away from the battery bank.

Third, notice the air inlet holes towards the bottom of the box. The boxes shown here use soffit vent covers over the holes to keep unwanted critters out.

Finally, and possibly most important, most of these boxes use a power vent fan in a 2" PVC pipe for ventilation.

The fan is switched on and off at battery gassing voltage by a voltage controlled relay in either your inverter, charge controller or a special stand-alone voltage controlled switch.

(See our battery venting kit and battery venting fan on page 56.) A passive thermosiphoning

vent system could also be used. This could be fashioned from 2" PVC pipe running up through the house and out the roof much like a plumbing vent. The power vent pipe has the advantage of exiting the wall next to the battery box, a much easier pipe run.

DC DISTRIBUTION EQUIPMENT

BE SAFE

Any connections to or from a battery bank should have some sort of fusing. A battery bank, or even just one battery stores a large amount of energy. Releasing all this energy instantly—as in a short circuit—can be very dangerous! The high currents involved in a short circuit can instantly melt wire insulation and start fires. The heat involved in a short circuit can cause nasty burns. **Be sure to fuse any and all connections to your bank.**

Prewired DC Distribution Panels



The prewired DC distribution panel consists of 15 amp DC circuit breakers, mounted in a MidNite Solar array combiner box. A ten foot, 6 ga. cable with lugs is wired in to connect to your battery bank. You or your electrician will connect two lugs to the battery bank and run your DC circuits into the circuit breaker box. The circuit breaker box accepts normal house wire (non-metallic sheathed cable) using standard non-metallic cable connectors. Your electrician or wiring inspector will be happy with this UL listed equipment. It is much easier to use and much higher quality than RV load centers.

Dimensions: Box 12.75" x 8" x 3.25"

Prewired DC Distribution Panel #1

751-104 Four Circuit Breakers \$219

This prewired panel has four DC circuit breakers in a six breaker box and a 10 foot, 6 ga. cable with lugs on the end to connect to your battery bank. Boxes are prewired and ready to accept your DC circuits.

Prewired DC Distribution Panel #2

751-106 Six Circuit Breakers \$249

This prewired panel has six DC circuit breakers in a six breaker box and a 10 foot, 6 ga. cable with lugs on the end to connect to your battery bank. Boxes are prewired and ready to accept your DC circuits.



DC Circuit Breaker Boxes

These small circuit breaker boxes are manufactured by MidNite Solar. They are ideal for small cabin DC distribution systems. They can also be used for Array and Controller disconnects. They require the DIN rail type circuit breakers.



757-011 Baby Box \$39

This box holds four DIN rail mount DC breakers. It has a 3/4" or 1" knockout at each end.

Dimensions: 7" x 3" x 2.5"



757-013 Big Baby Box \$48

This box holds four DIN rail mount DC breakers. It has two 3/4" or 1" knockouts and a 1/2" knockout at each end. Mounted inside is a ground lug and provisions for a short bus-bar. We use this box for our combo array and charge controller disconnect.

Dimensions: 8" x 5" x 2.5"

DIN Rail Mount DC Breakers

343-0xx DIN Rail Circuit Breakers \$15
10, 15, 20, 30, 40, 50, 63 Amps
10,000A interrupt current

Use these DC circuit breakers in the Baby Box and Big baby boxes listed above. They also fit in our pre-wired DC disconnect boxes as well as all of our pre-wired inverter systems. Because these breakers are rated for 10,000 amps interrupt current, you do not have to use a series fuse with them. They are rated for 150 VDC.



757-014 Quad Box \$58

This enclosure holds up to four panel mount DC circuit breakers. You would use this box when higher than 63 amp circuit breakers are required.

Dimensions: 8" x 5" x 4"



Panel Mount DC Breakers

746-1xx Panel Mount \$25
10, 15, 30, 40, 50, 60, 80, 100 Amps

For use in the Quad box or E-Panels. 150VDC, 10,000A interrupt current
Dimensions: 3/4" x 1 1/2" opening, 1/4" studs



DC FUSES and BUS BARS

ATC Fuse Box

- 354-007 ATC Fuse Box, 6 Positions \$18.00**
1.5" x 5.5" x 4.5" Plastic
- 354-009 ATC Fuse Box, 9 Positions \$35.00**
1.75" x 4.5" x 7" Metal

These fuse boxes use ATC automotive type fuses for DC distribution. They can be used in a camp or small cottage where a large DC distribution system isn't required. They have lugs to receive up to #4 ga. input wires. They have either a 6 or a 9 circuit fuse block and a negative bus both which will accept up to #10 ga. wires.



ATC Fuse Block

- 354-006 ATC Fuse Block \$12.00**

This 6 position fuse block will accept #10 ga. wire in its distribution terminals. The main power lug accepts #4 ga. wire. The negative bus bar has 11 holes which accept #10 ga. or smaller wire and 4 holes which accept #2 ga. or smaller wire. Use this fuse block along with the negative bus bar to make your own DC distribution panel.



ATC Fuse Holders

- 354-001 18 Ga. 3" Pigtails \$2.00**
Cover Included
- 354-002 12 Ga. 4" Pigtails \$2.50**
Cover Included

These ATC fuse holders can be used for that instance when only one fuse may be needed. They are effective and safe, and certainly better than no fuse at all. See below for fuses.



ATC Fuses

- 345-002,005,-010,-015,-020,-025,-030 \$0.35 each**
2 thru 30 amps respectively

Use these fuses in the ATC fuse boxes, fuse block or fuse holders described above.



Maxi Fuse Holders

- 354-004 6 Ga. Maxi Fuse Holder \$13.00**
Cover Included

Use the Maxi Fuse and fuse holder when a



larger than 30A fuse is required.

Maxi Fuses

- 347-020,-030,-040,-050,-060 \$2.00**
20 through 60
amps respectively

Use the Maxi fuses in the fuse holders described above.



Fuse Blocks

- 354-030 30 A Fuse Block \$15**
- 354-060 60 A Fuse Block \$19**

These are fuse holders for RK5 cartridge fuses. They can be used in situations where safety is desired, but code may not be required. They should be installed in an inaccessible place; or you should manufacture a cover for them. Fuses are available at most "big box" stores.



MidNite Solar Bus Bars

- 757-006 White Bus Bar \$17**
- 757-007 Red Bus Bar \$17**
- 757-008 Black Bus Bar \$17**
- 757-019 Ground Bus Bar \$13**

These bus bars are mounted in plastic end-cap insulators for use in all kinds of AC and DC wiring. The bar has four 1/0 and eleven #6 useable wire slots. Two 10-32 mounting screws are provided. The ground bar omits the end-cap insulators. Dimensions: 4.75"L x 7/8"W x 1.75H



Terminal Block

- 325-004 \$11**

This is a four position terminal block rated for 85 amps. It will accept up to 4 AWG wire. It can be used to facilitate wiring between your array and charge controller.

L 2-3/8" D 1-1/4" H 1-1/8"

Terminal Block

- 325-006 \$8**

This is a six position terminal block rated for 63 amps. It will accept up to 6 AWG wire. It can be used to facilitate wiring between your array and charge controller.

L 3-3/8" D 1-1/16" H 1-1/16"



DC WIRING DEVICES

12 or 24 volt Receptacles and Plugs

We recommend using a 240 volt type, duplex receptacle and a matching plug for your 12 or 24 volt circuits. These are heavy duty and a different configuration than the 120 volt plugs in your home, so the wrong plug cannot be plugged into either system. The plugs are three pronged so one also cannot turn them upside down and reverse the polarity of an appliance such as a DC fluorescent light. This duplex receptacle takes the same cover plate and wall box as a regular 120 volt duplex receptacle.



341-240	Duplex Receptacle	\$5.00
	Box of Ten	\$40.00
340-240	Plug to Match	\$7.49
	Box of Ten	\$69.00

Lighter Plug Wall Plate Receptacle

341-012 \$4.00

Nice for a cabin or wherever one or two DC outlets are needed.



Lighter Plug

340-012 \$2.50

A plug for the above outlet. Fits in your auto cigar lighter as well.



Lighter Plug and Socket Extension

341-013 \$9

This cord set can be used as an extension cord for a fixture with a lighter plug. It can also be used as a female adapter from your battery bank. Simply remove the plug and directly wire the socket to your bank using a fuse in the positive line. The cord is 10' long.



Tray Cable

304-012	12 AWG Tray Cable	\$0.69/ft.
304-010	10 AWG Tray cable	\$0.99/ft.



Tray cable consists of two THHN conductors covered by an outer PVC jacket. It is sunlight resistant and approved for direct burial in wet or dry locations. It can be used for module interconnects and sub-array wiring. We stock 12 AWG and 10 AWG.

About DC Switches: The DC rated switch we used to carry is no longer manufactured. As far as we know, a DC-rated wall switch is not being made at this time. We feel a Leviton Pro-Grade 20A wall switch (available from an electrical supplier or a big box store) will perform as well as, if not better, than the switches we used to carry. However, it is NOT UL rated for DC use. Use for 12 VDC or 24 VDC only.

Wire by the Foot

Hook-Up Wire

Single THHN Wire, stranded copper.



300-101	10 AWG Black	\$0.39 /ft
300-102	10 AWG Red	\$0.39 /ft.
300-061	6 AWG Black	\$0.99 /ft.
300-062	6 AWG Red	\$0.99 /ft
300-081	8 AWG Black	\$0.66 /ft
300-082	8 AWG Red	\$0.66 /ft

UF Grade Cable



UF wire is direct burial, sunlight resistant cable with 1 black, 1 white, 1 bare ground, all covered with sunlight and water resistant second insulation. For outside wiring, especially as an array down lead.

301-101	10 ga. UF Cable	\$1.39 /ft
301-102	8 ga. UF Cable	\$2.19 /ft

UL Listed Battery Cable



This is UL listed Type AWM/TEW/THW X-Flex battery cable. It is composed of many small strands of copper wire. This makes it flexible and easy to use in the large wire sizes.

303-004	4 ga. Battery Cable	\$2.19 /ft
303-002	2 ga. Battery Cable	\$3.49 /ft
303-210	2/0 ga. Battery Cable	\$5.99 /ft
303-410	4/0 ga. Battery Cable	\$9.99 /ft

Pre-made Battery Cables (See Batteries pg.56)
Pre-made Inverter Cables (See Inverters pg. 52)



USE Wire

This is a direct burial, sunlight resistant, outside grade, single conductor copper, stranded wire. We use 12 ga. to make our module interconnect cables. It should also be used for wiring between sub-arrays and array mounted junction boxes. We stock it in black or red and in both 10 and 12 gauge. Use 10 ga. for wiring between sub-arrays and 12 ga. for module interconnects.

302-101	USE 10 ga. Wire, Black	\$0.99/ft.
302-102	USE 10 ga. Wire, Red	\$0.99/ft.
302-121	USE 12 ga. Wire, Black	\$0.70/ft.
302-122	USE 12 ga. Wire, Red	\$0.70/ft.

AUTO GENERATOR START, TIMERS, DC DEVICES

Voltage Controlled Switches

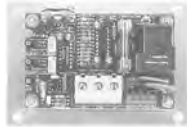
An adjustable voltage relay switch, available Active High, or Active Low.

792-010	Open Frame-Activate High	\$89
	10-60V 30A VCS-1AH	
792-011	Enclosed-Activate High	\$139
	10-60V 30A VCS-2AH	
792-012	Open Frame-Activate Low	\$89
	10-60V 30A VCS-1AL	
792-013	Enclosed-Activate Low	\$139
	10-60V 30A VCS-2AL	



These voltage controlled switches are activated when the battery bank voltage reaches a user adjusted set point. The "Activate High" model is commonly used to turn on a battery vent fan. The "Activate Low" model can be used as a load controller. Both versions work

at 12, 18, 24, 36 and 48 volts DC. They can switch up to 30 amps. A thorough instruction manual complete with various hook-up diagrams is included.



Dimensions:

Open Frame: 5.2 L x 2.9" W x 1.8" H

Enclosed Unit: Approx. 10"L x 6"W x 2.5" H

Generator Starter

Advanced generator control based on battery voltage.

792-001	Enclosed 12-48 VDC	\$369
792-002	PC Board Only 12-48 VDC	\$289

The Model GS-2 Universal Generator Starter is used to automatically start and stop your generator at user settable battery bank voltage levels. This unit supports 2, 3 and 4 wire systems as well as incorporating advanced control systems for glowplug activation or load control. Relay activation is indicated by LED's for precrank, crank, load, run, stop and fault. The unit is mounted in a NEMA 3R box: 10" x 8" x 4" deep.



The Model GS-1 is the same as the GS-2 but without an enclosure (PC board only).

DC Conversion/Autotransformer

DC Conversion 12 to 24V

792-029	6A @ 24V CV 12/24-6	\$189
792-030	12A @ 24V CV 12/24-12	\$319

DC Conversion 24 to 12V

792-027	20A @ 12V PPT 12/24-20	\$189
792-028	5A @ 12V PPT 12/24-5	\$129

DC Conversion 48 to 12V

792-031	10A @ 12V PPT 48-10R12	\$229
792-032	20A @ 12V PPT 48-20R12	\$429

These devices are used to convert DC voltages from one voltage to another. The DC conversion units maintain a set output voltage over a range of input voltages. For example, you could achieve a constant 12.6 volts from a 24 volt battery bank which might range from 24 volts to 29 volts. We carry nominal 12 or 24 volt output units which can be field adjusted to fine tune the actual output voltage. All versions operate at greater than 95% efficiency.



The devices are mounted in a weather-tight NEMA 4 enclosure which measures 4.5"L x 2.9"W x 2.6" H.

Programmable 12V Timer

909-007	884 Timer	\$69
---------	-----------	------

With this timer you can control up to 16 amps at up to 250 volts AC or 36 volts DC. It is a 7 day 8 event timer. Once the timer is connected to 12 volts and reset, its internal battery will maintain its quartz clock and programming for up to 5 years. However, it must be connected to a 12 volt source for its switching functions to work. It only functions as a switch, with normally open contacts switching to closed.



Dimensions: 2 3/4" x 2 3/4" x 2 1/2" deep

Solar Converters, the Canadian company that designs and manufactures the majority of the devices to the left, has many other types of devices available. They have devices that power pumps or charge batteries from either a higher or lower voltage source than what the pump or battery bank is rated for. They have lighting controllers and differential temperature controllers. They also offer cathode protection devices, voltage alarms and universal battery trickle chargers. For descriptions of these devices, or manuals for all their devices, visit their website at solarconverters.com. We can drop-ship any device they offer directly to you.

AC WATER PUMPING

Careful planning of your water system ahead of time will save a lot of headaches and possibly a lot of money in the future. Many people have called after they installed their pump, only to find out they will now need to purchase a larger inverter than they had planned on, or a transformer to run their new 230 VAC pump. We will be glad to help you with your water system design or talk to your well man to explain why you need a 115 VAC Grundfos Soft-Start pump, rather than the 230 VAC pump he has in his truck! When calling for help with your water system design please have the following information at hand:

- Type of Power System - 120 VAC, 120/240VAC or 12/ 24 VDC
- Horizontal Distance from Well to Home
- Depth of Well
- Static Water Level (Distance from Ground Surface to Water Level in Well)
- Elevation from Top of Well to Home
- Pressurized System?
- Pipe Size (if already installed)

AC WATER PUMPING

Most locations in New England will require a deep well and a submersible pump. A 1500 watt inverter will power a 115 volt soft-start AC submersible pump. If you already have a 230 volt pump you'll need a 240/120VAC inverter, or the OutBack PSX-240 step-up transformer to use with a 120VAC inverter. If you provide us with the well specifications listed above, we will recommend the Grundfos model AC pump and wire size that you can take to your well pump installer. Our pumping design will be for your alternative energy home powered by a inverter. The well man's design will be for a suburban home without an inverter. We sell efficient deep well pumps that are picked specifically to run on an inverter. We have good prices on these pumps. Buy one from us if you're at all uncertain as to which one to get from your well man.

A submersible must be set at the proper depth. The Grundfos 115V pumps can be set up to 140' below the pressure tank. Often the pressure tank is at the same level as the top of the well so the above distances become the depth the pump is set in the well. If you must set your pump deeper than 140' you will need to use a 230 VAC pump with a step-up transformer, if you only have a 120VAC inverter.

If you have a shallow or dug well you can use the 115VAC shallow pump shown below, or possibly a DC suction pump. Call for details and a design that will work for you.

921-007 Shallow Well Pump \$429
1/2 hp 115v 5 gpm
Capacitor Start



OutBack Auto-Transformer

746-012 PSX-240 6.0 kW Transformer \$539

Specially designed to step up modified sine wave inverter output to 240 VAC. A good solution for running 240 VAC equipment such as a large submersible pump.



It can also be used to balance the output of a 240 volt 6 kW generator to achieve full 120 volt 30 amp output.

Call Toll Free: (800) 914-4131

Grundfos Soft-Start Pumps

Grundfos makes an SQ line of submersible pumps noted for their ability to "soft-start" i.e. not draw any extra starting current. This means the Grundfos 1/2 hp SQ pumps can run reliably on a 1500 watt DR inverter. The SQ pumps will fit into a 3" well casing and are protected from dry running, overvoltage, under-voltage and overtemperature. They are constructed of stainless steel with polyimide vanes and valves.

Listed below are models from 1/2 to 1 hp which will pump a nominal 5 gpm from 40' to 500' at 30 to 50 psi. Of course the gpm varies with the depth and pressure required. The 1/2 hp pump is available in 115 VAC model; all the pumps are available in 230 VAC models.



Grundfos SQ Pumps						
Item No.	HP	Volts	Service Factor Watts	Max Depth 50psi @2 gpm	Min Inverter	Price
5 GPM Models						
923-090	1/2	115	552	25	1000W	\$719
923-091	1/2	230	576	25	1000W	\$719
923-140	1/2	115	736	110	1000W	\$729
923-141	1/2	230	768	110	1000W	\$729
923-180	1/2	115	1012	175	1500W	\$749
923-181	1/2	230	1032	175	1500W	\$749
923-230	1/2	230	1224	260	1500W	\$879
923-270	1/2	230	1488	325	2400W	\$899
923-320	3/4	230	1704	395	2400W	\$919
923-360	1	230	2160	475	3600W	\$1049
923-410	1	230	2448	545	3600W	\$1099
923-450	1.5	230	2664	645	3600W	\$1109
10 GPM Models						
923-110	1/2	115	759	30	1000W	\$669
923-111	1/2	230	720	30	1000W	\$669
923-160	1/2	115	920	105	1500W	\$679
923-161	1/2	230	960	105	1500W	\$679
923-200	3/4	230	1440	155	2000W	\$769
923-240	3/4	230	1872	245	2800W	\$809
923-290	1	230	2328	310	3500W	\$899
923-330	1.5	230	2664	395	3500W	\$919

AC Pump Installation

Most of us will want to have an AC pumping system for a "real" home water system, especially throughout the north east. Our wells tend to be between 100 and 200 feet deep with a static level of 20' to 50'. This is an ideal situation for a 1/2 hp AC submersible pump. It will not be as efficient as a DC pump, but, given you will have a large inverter anyway, the reliability of an AC system can't be beat. Following are installation and design parameters for AC pumping systems.

AC Pump Installation Kit

921-001 \$99

This kit contains all the parts necessary to install your AC pump except for the pipe, wire and pump rope (all of which depend on well depth and distance between the well and house). Included in the kit are a torque arrestor, 6 wire guides, a pitless adapter, 3 1" male adapters, a heat shrink splice kit and 8 stainless steel clamps.



Tank Installation Kit

540-001 **Tank Installation Kit \$99**

This tank installation kit consists of all the parts attached to the pressure tank manifold. Included in the kit are a check valve, a ball valve, a pressure gauge, a pressure switch, a drain cock, and a relief valve. Be sure to get the proper size manifold for your tank.



You will need a tank "tee" to go with this kit. Tees must be sized for the specific tank used: both male or female and thread size. Tees usually cost about \$15 to \$20.



FLEXCON FLEX-LITE Diaphragm Storage Tanks

These are fiberglass water storage tanks with a butyl rubber inner liner. They are precharged with air to 38 psi. Their draw-down between pump cycles is listed in the chart below. Models FL 5 to FL12 can be UPSed. Models FL 17 and larger must be freighted.

Part No.	Model No.	Capacity in Gals/ Connection	Drawdown in Gallons	20-40psi	30-50psi	Height Inches	Diameter Inches	Weight Lbs	Price
540-015	FL 5	15.0 /1"	6	5.1	25.6	16.5	19	\$289	
540-022	FL 7	22 /1"	6.7	5.9	34.1	16.5	24	\$279	
540-035	FL 12	35 /1"	14.1	11.9	48.9	16.5	33.5	\$389	
540-050	FL 17	50 /1.25"	20.1	22.1	43.3	21.4	47	\$589	
540-065	FL 22	65 /1.25"	26.1	18	51.3	21.4	47.9	\$699	
540-082	FL 28	82 /1.25"	32.6	27.6	64.7	21.4	69.5	\$839	
540-090	FL 30	90 /1.25"	36.2	30.6	57.0	24.2	77	\$839	

SINGLE PHASE MOTORS – MAXIMUM WIRE LENGTH										
Motor Rating		Copper Wire Size								
Volts	HP	14	12	10	8	6	4	2	0	00
115V	1/2	134	212	333	522	810	1240	1890	2550	
	3/4	100	159	249	390	608	930	1410	1910	
230V	1/2	404	641	1003	1575	2450	3750	5710		
	3/4	293	473	740	1161	1810	2760	4210	5680	
	1	248	392	617	968	1507	2300	3510	4730	5920

		DEPTH TO PUMPING WATER LEVEL (LIFT) IN FEET																					
PUMP MODEL	HP	PSI	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	340	400	460			
SSQ/SQE05A-180	1/2	0			7.9	7.5	7.1	6.7	6.2	5.6	5.1	4.4	3.8	2.6	1.1								
		20	7.8	7.4	7	6.5	6.1	5.5	4.9	4.2	3.3	2.9	0.8										
		30	7.3	6.9	6.5	5.9	5.4	4.8	4.1	3.2	2	0.2											
		40	6.9	6.5	5.9	5.4	4.7	4	3.1	2	0.1												
		50	6.3	5.8	5.3	4.6	3.8	2.9	1.6														
		60	5.7	5.1	4.4	3.6	2.6	1.2															
SHUT-OFF PSI:			110	102	93	84	76	67	58	50	41	33	24	15	7								
SSQ/SQE05B-230	1/2	0			8	7.7	7.3	6.9	6.5	6.1	5.6	5.1	4.6	4.1	3.4	2.8	0.8						
		20		8	7.6	7.1	6.8	6.3	5.9	5.4	5	4.5	3.9	3.3	2.6	1.8	0.6						
		30	7.9	7.5	7.1	6.7	6.3	5.9	5.4	4.9	4.4	3.8	3.1	2.4	1.5								
		40	7.5	7.1	6.7	6.3	5.8	5.4	4.9	4.3	3.7	3.1	2.3	1.4									
		50	7	6.6	6.2	5.8	5.3	4.8	4.2	3.6	2.9	2.2	1.2										
		60	6.5	6.1	5.6	5.1	4.6	4.1	3.4	2.8	2	0.9											
SHUT-OFF PSI:			143	134	126	117	108	100	91	82	74	65	56	48	39	30	22	4					

DC WATER PUMPING

12V or 24V DC Water Pumping

If you have a shallow well or spring that is not too far from your home and have a small PV system without an inverter, then use a 12 volt or 24 volt DC pump. A DC suction pump can lift water from a depth of about 12 to 14 feet maximum and pressurize a system, although at a slower rate than an AC pump. A DC submersible pump can be set as deep as 230' but will have only 1 to 2 gpm output. DC pumps can also be used effectively to pressurize an existing gravity flow system. The best part about DC pumps is the low amount of power needed per gallon of water pumped.

NOTE: All the pumps on this page require special input and output fittings. SHURflo recommends that flexible tubing be used on the input and output sides of these pumps as well. Please consider our installation kits on page 61 for use with these pumps.



SHURflo DC Water Pumps

SHURflo water pumps are diaphragm pumps. They can run dry and not harm themselves. They do not need a filter, only an intake strainer. Because these pumps come out of the industrial sector, they are mass produced and less expensive than other DC pumps. They will draw water up vertically about 12 feet and self-prime from that height as well. They have an internal check valve and a pressure switch that will turn the pump on at about 28 PSI and off at 40 PSI. For a pressurized system a foot valve is required on the pipe at the bottom of the well to maintain prime. The addition of an expansion tank allows the system to be more efficient and easier on the pump (except for the new Smart Sensor pump). SHURflo pumps should last about 3 to 5 years in a PV home. They come with a one year warranty. The pump head is easily replaced if a problem should occur.

SHURflo 144 DC Pump

- 922-144A SHURflo 144 \$139
12 volts, 3 GPM, 6-8 amps draw
- 922-144B SHURflo 144 \$139
24 volts, 3 GPM, 3-5 amps draw



This pump is a lighter duty pump than the 145/534. It will turn on at 28 PSI and off at 40 PSI. It can be used without a pressure tank, coming on when the faucet is on and shutting off when the faucet is turned off. However, we always recommend the use of even a small pressure tank to smooth the flow. Good for occasional use in cabins or where the water system is not in daily use. One year warranty.

SHURflo 9300 Series Submersible Pump

- 921-101 \$749

This pump can produce up to 2 GPM from depths up to 230 feet when run on 24 volts. It will run on two 50 watt modules as well as on a battery system. Featuring strong lightweight construction, it has a corrosion proof housing with stainless steel fasteners. It will run on 12 or 24 volts and can run dry without damage. The pump requires a 4" or larger well casing.



SHURflo 145 12VDC Pump

- 922-145 SHURflo 145 \$199
12 volts, 4.5A open-flow to 9A @ 45psi
3.6 gpm open-flow to 2 gpm @ 45psi

The 145 pump is the work-horse of the SHURflo line. This is the pump to use for a full home system if your well is suitable, or for pressurizing gravity feed systems. Maximum inlet pressure is 30 psi. The 145 will self-prime from 9 vertical feet (but we have found it will work reasonably well from 12 to 15 vertical feet). It includes an integrated pressure switch and check valve. The pressure switch is preset to turn off at 45 psi and turn back on at 25 psi. The 145 has a heavy duty DC motor, now manufactured by SHURflo, with a heavy duty cooling heat sink. This pump should last 5 years under daily use. Even then its likely only the pump head will need replacing. It has a one year warranty.



SHURflo 534 24VDC Pump

- 922-534 SHURflo 534 \$209
24 volts, 3.0A open-flow to 5A @ 45psi
3.6 gpm open-flow to 2.2 gpm @ 45psi

The 534 is the 24 volt equivalent to the 12V 145.

SHURflo 5050 12VDC Pump

- 922-5012 SHURflo 5000 12VDC \$209
12 volts, 6.5A open-flow to 17A @ 60psi
5.3 gpm open-flow to 3.4 gpm @ 60psi

Shurflo's new 5000 Series pumps include a unique diaphragm design whereby solid pistons are co-molded to the pump diaphragm, forming a leak proof molecular bond for ultimate durability and pumping efficiency. They feature a heavy-duty sealed motor, with a self-priming pump head. The pump can run dry without damage and for added safety, incorporates thermal overload protection. The pump will be available in 24VDC in the near future.

10"L x 5"W x 4"H.

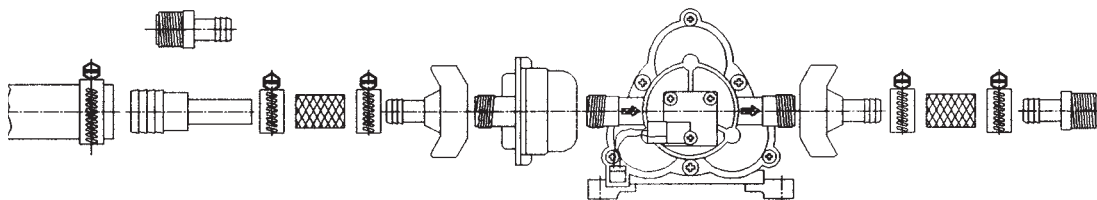


SHURflo Installation Kit

922-001 Install Kit for Pump Models 144 - 12V&24V, 145 and 534 \$25

One idiosyncrasy of diaphragm pumps is noise. They are not loud to listen to but they may transmit vibrations through your plumbing system. This problem is solved with some flexible pipe between the pump and the home plumbing. We offer an installation kit with all the necessary parts to install the pump while minimizing noise transmission.

This kit consists of one intake strainer, two 18" long pieces of high pressure flexible hose, and the fittings and clamps needed to install a SHURflo pump in a home. On the intake side, our last fitting goes into a standard one inch poly underground piping. We also include a 1/2 inch threaded fitting to begin the intake side. On the output side of the pump our last fitting goes to a standard 1/2 inch pipe fitting. You must then go to your pressure tank etc. Installation instructions and diagrams are included.



510-001 Filter Screen For SHURflo Pumps \$9

SHURflo strongly recommends the use of a filter screen at the input of their diaphragm pumps. If any foreign matter should lodge itself under a diaphragm lip, the resulting loss of suction could severely damage the pump. If you do not need the above installation kit, please be sure to at least purchase this filter screen.



922-002 Pump Head Kit For 2088 SHURflo Pumps \$79

This pump head is usually all that is needed to repair any of the SHURflo pumps we carry. If you're really remote, bring a spare along with you. The pump head includes the pressure switch and check valve, as well as the entire diaphragm section of the pump.



922-007 Upper Housing with Pressure Switch For 2088 SHURflo Pumps \$25

Same as above but without diaphragm drive. Typically used to replace a defective pressure switch.

Diaphragm / Drive Kit 922-003 For SHURflo Pumps \$29.00

This kit can be used to repair SHURflo Model 144, 145 or 534 type pumps. It would be used to replace a defective diaphragm, if your pump head housing and pressure switch were still serviceable.



Float Switch 520-002 12,24,120 or 230V 13A \$59

This single pole single throw float switch can be used to turn a pump on or off depending on the level of liquid in your container. The float is tethered to the side of the tank and is activated depending on the depth of liquid. Wiring and mechanical installations are included.



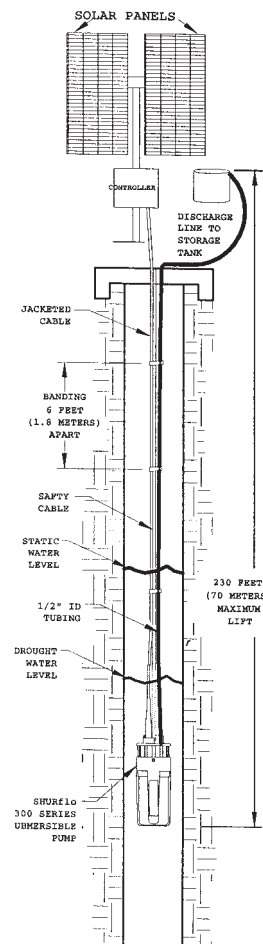
Valve Kit for 9300 Submersible Pump 922-006 For SHURflo 9300 Pump \$27.00
Used to repair 9300 pump.



DC Pump Notes

When hooking up a DC pump, which has relatively lower suction capabilities when compared with an AC pump, you must take extra care with the input suction line. First, the suction line cannot afford to have any vacuum leaks. Any air getting into the suction line will severely hamper the pump's operation. Second, there should be no ups and downs in the input pipe-line. Any "hump" in this line is a place where air can migrate out of the water or otherwise collect, to form an eventual vapor lock. This can put a severe strain on the pump, and cause the pump to fail. If your pump suddenly seems weak or extra noisy, check your suction line for vapor lock or vacuum leaks.

SHURflo 9300 DC Submersible Pump Installation



DC WATER PUMPING

Flowlight Booster Pump

The Flowlight Booster Pump provides city water pressure anywhere. It has been a standard in home renewable energy systems since 1986. It is economical for domestic water supply, drip irrigation and water purification.

A booster pump is far more cost effective than an elevated tank, providing pressure equivalent to over 100 feet of elevation. The Flowlight booster pump can provide 3 to 5.5 gallons per minute at pressure as high as 65 psi from shallow water sources.

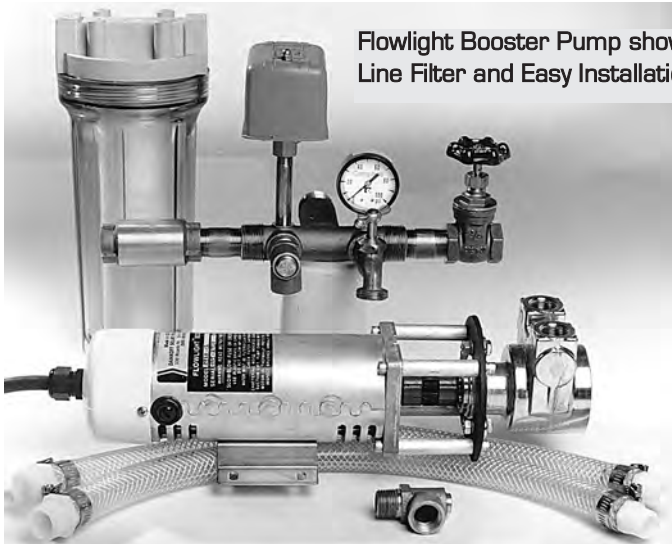
This DC pump uses one third to one half the energy of a conventional AC pump, and eliminates the high starting surges that push inverters to the limit. It is more powerful, quieter, and much more durable than plastic RV/ Marine pumps.

Wearing parts are replaceable, and typically last 5 to 10 years. Overall life expectancy is 15 to 20 years. Flowlight's complete instruction manual and Easy installation kit make this pump simple for anyone to install and service, with no previous experience.

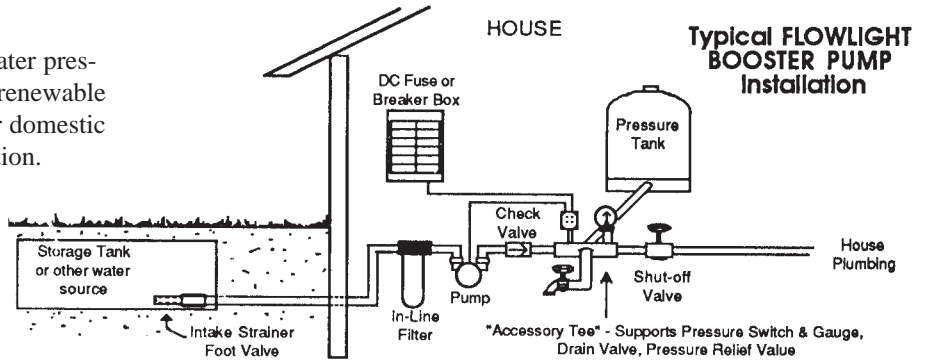
920-012	Flowlight Booster Pump 12VDC	\$711
920-024	Flowlight Booster Pump 24VDC	\$711
920-007	Easy Installation Kit	\$118
920-005	10" In-Line Filter w/Cartridge	\$44
920-006	10" Filter Cartridges-2 Pack	\$19
920-003	Dry Run Switch	\$87
920-001	Booster Pump Replacement Head	\$326
920-002	Booster Pump Replacement Brushes	\$45pr

Please remember to specify voltage when ordering a booster pump. They are available in both 12 and 24 volts DC. A "low flow" model is also available. This model should be used when suction runs are difficult, such as long horizontal runs or suction depths from 16 to 18 feet. Call for advice.

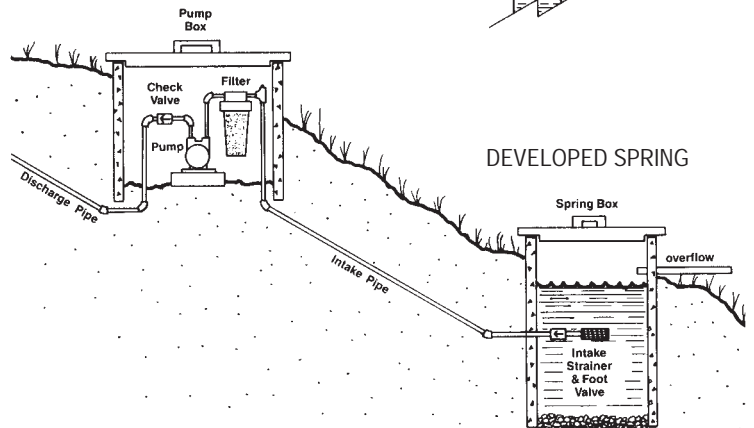
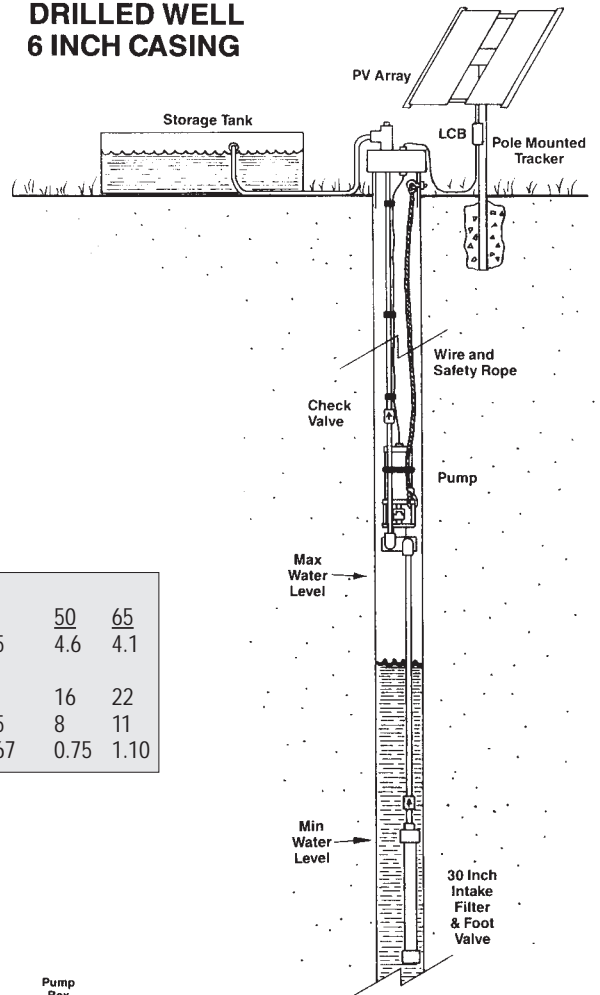
Standard Model 2920				
Pressure - PSI	30	40	50	65
Flow Rate - GPM	4.5	4.5	4.6	4.1
Current Draw - Amps				
@ 12 Volts	13	15	16	22
@ 24 Volts	6.5	7.5	8	11
Watt-Hrs per Gallon	0.6	0.67	0.75	1.10



Flowlight Booster Pump shown with In-Line Filter and Easy Installation Kit



DRILLED WELL 6 INCH CASING



Sun-Mar Composting Toilets

EXCEL N.E.

904-001 Excel N.E. \$1595
 Dimensions: H 31", D 33", W 22.5"
 Now available in White or Bone

The EXCEL N.E. was first introduced in 1981 and has proven itself capable of handling 5-7 people in weekend and vacation use or 2-3 in residential use. Indeed the EXCEL N.E. long ago established itself as the standard toilet for those living "off the grid". It consists of a large volume insulated bio-drum, a finishing drawer and an evaporating chamber. The EXCEL N.E. has a 4" vent (supplied with the unit) which is mounted at the top rear. This vent acts like the chimney on a woodstove to induce draft, and draw air in through the intake holes, and in from around the toilet seat. To get good air movement, the vent should be erected as close to vertical as possible.

If the EXCEL N.E. is going to be used heavily, or residentially, or is to be installed in a place which is particularly subject to a downdraft, a DC fan should be installed in the vent stack. The fan draws 1.4 watts and can be used with a solar panel (12v) and/or battery. A 1" drain is fitted to the rear of the unit, and this should be connected to an approved drain pit or similar facility.

This toilet works well if it is used as it is designed to be used. The toilet should be at indoor temperature to allow liquids to evaporate up the 4" vent pipe, and to allow the bacteria to be active and thus digest the waste. We used one every day at New England Solar Electric when we were without a septic system in our previous location. Our composting toilet was cold for most of the winter, but functioned well anyway. We added an efficient DC fan to help evaporate the liquid during the cold months.

Sun-Mars are made in Canada and shipped freight pre-paid from Buffalo. Freight charges to the northeast are usually in the \$80-\$100 range. Allow 2-3 weeks for delivery

Vent Fan for Sun-Mar Toilets

904-012 12 Volt 1.4W Fan \$55

Used to increase capacity and evaporation on EXCEL or CENTREX N.E. Recommended for residential or heavy use. The fan comes mounted in a piece of Sun-Mar 4" duct pipe and mounts directly on top of the toilet. Consumes 1.4 watts at 12 or 24 volts. Be sure to specify voltage.



CENTREX N.E.

904-002 Centrix 1000 N.E. \$1595
 Continuous Use: N/A
 Weekend & Vacation Use: 4/6
 H 27.5", D 26.25", W 35.5"

904-009 Centrix 2000 N.E. \$1795
 Continuous Use: 3/5
 Weekend & Vacation Use: 6/8
 H 27.5", D 26.5", W 48.75"

904-010 Centrix 3000 N.E. \$1995
 Continuous Use: 5/7
 Weekend & Vacation Use: 8/10
 H 31.5", D 26.5", W 69.5"

The CENTREX N.E. is a non-electric central composting toilet system. This type of system is designed for those who prefer a flush toilet in the bathroom, with the composting unit outside or in the basement. This central composting unit is normally within 20' of the toilet and is connected via a 3" plumbing pipe. Installation requires hooking up the water supply to the low flush toilet, connecting the 3" waste piping to the composting unit, and assembling the vent stack (included with the unit).

CENTREX N.E.'s are low profile units making installations under buildings where height is important much easier. Although distances of over 20' between the low flush toilet and composting bio-drum are not normally recommended, central units have been successfully installed up to 40' away from the toilet.

Sun-Mar Low Flush Toilets

904-003 Dry Toilet \$325
904-004 SEALAND 510 Plus \$350

The Sealand 510 Plus is 1-2 pint super low flush toilets for use with the Centrex N.E. central composting toilet system described above. The 510 Plus is a regular size toilet, and is made of fine china for superior quality, hygiene and cleanability. The Sealand 510 toilet come complete with seat assembly, pedestal cover, floor seal and mounting bolt package. White Only.

Composting Aids

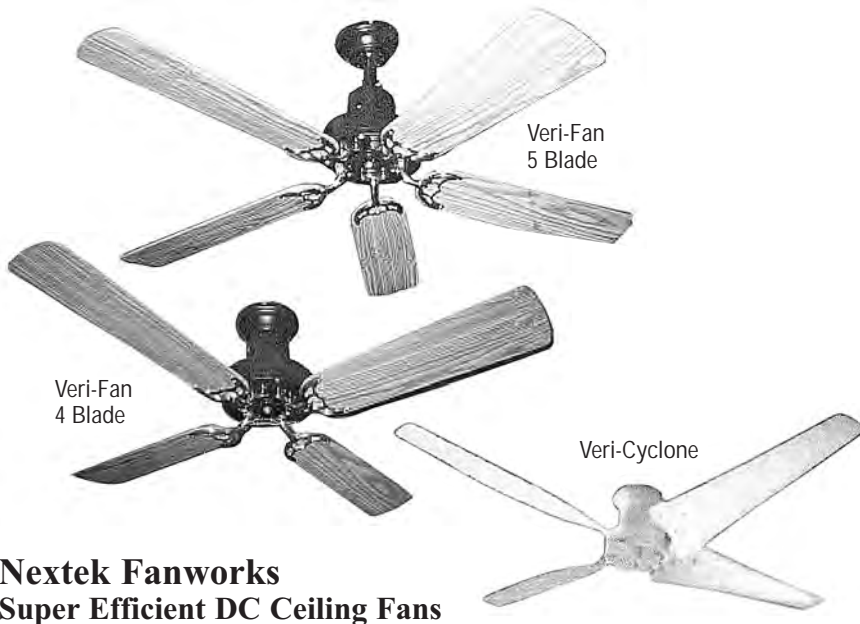
904-006 Compost Quick 16 oz. \$13
 Combination toilet bowl cleaner and compost accelerator.

904-007 Microbe Mix 18 oz. \$16
 Dried aerobic microbes and enzymes to initiate composting.

904-008 Compost Sure* 7 gal bag \$25
 Mixture coarse peat moss and hemp bulking material.

*Note: Exact shipping cost will be charged on this item.

DC FANS



Nextek Fanworks Super Efficient DC Ceiling Fans

- | | | |
|---------|--|-------|
| 903-006 | Vari-Fan 42" 4 and/or 5 Blades | \$179 |
| 903-001 | Vari-Cyclone 60" 4 Blade Painted | \$239 |
| 903-010 | Replacement Motor for either fan above | \$89 |

Veri-Fan

The Vari-Fan comes with all the hardware that allows it to be mounted close to the ceiling or hung from its 4" down rod (longer rods available—see below).

Each Vari-Fan comes with 5 blades and blade arms leaving the choice up to you whether to mount the fan with 4 or 5 blades. Each wooden fan blade is reversible with a light oak finish on one side and a dark oak finish on the reverse side—again allowing you to choose the finish that will go best with your decor.

The Vari-Fan is a brand new fan (not a retrofit) made of light but very durable ABS plastic, cast metal blade arms plated with a bright brass finish, and balanced wood blades. A heavy duty permanent magnet motor—drawing only 0.4 amp at 12 or 0.8 amp 24 V DC powers each fan. The Vari-Fan comes with all mounting hardware requiring only a screwdriver and pliers for minor assembly and hanging.

The molded housing of the Vari-Fan comes with a matte black finish. It will not dent or scratch easily, or be subject to corrosion in humid climates. Painting instructions are included with each fan. Estimated time to prepare and paint the Vari-Fan is one hour.

Veri-Cyclone

The Veri-Cyclone uses "Gossamer Wind" technology in the design of its blades allowing the Veri-Cyclone to produce up to 40% more air flow than the 5 blade Veri-Fan described above while using the same amount of energy. The motor and motor housing are the same for both fans. The Veri-Cyclone can be mounted close mount position or on a 16" down-rod included with the fan. This fan has four blades with spanned diameter of 60" and is painted all white. Painting instructions are included as is all necessary mounting hardware.

Ceiling Fan Down-Rod Extensions

Bring ceiling fans lower for comfort and greater efficiency.

- | | | |
|---------|------------|------|
| 903-012 | 12" Length | \$12 |
| 903-024 | 24" Length | \$15 |

Variable Speed Fan Control

- | | | |
|---------|--------------------------|------|
| 908-001 | 12V to 28V Speed Control | \$79 |
| 908-003 | 48V Version for RCH Fans | \$89 |

Recommended by Nextek Fanworks for their ceiling fans, this is very quiet, dependable speed control. It will work equally well on both 12V or 24V battery systems. On either battery bank voltage it allows the fan to run from 12V to 28V DC. i.e. it acts as a "voltage doubler" on a 12V battery bank and a speed control on a 24V battery bank. The control also incorporates a reversing switch with a center "OFF" position allowing easy duplication of an optimal speed setting. This control is internally protected from wiring the input with incorrect polarity. It also features output short circuit protection. Each unit comes complete and ready to install with a mounting plate for a single gang box.

A 48 VDC version is available for operating a the fan on a 48V battery bank.



Box or Computer Fans

These fans are very popular for winter air circulation. They move 105 cubic feet of air per minute. The outside dimensions are 4.75" X 4.75". You can mount them in the corner of a doorway to circulate woodstove heat around the house. The 24V fan uses .35 amps. and the 12V fan uses .55 amps. We have 120V AC fans that use 14 watts.

- | | | |
|---------|-------------|------|
| 903-003 | 12V DC Fan | \$23 |
| 903-004 | 24V DC Fan | \$36 |
| 903-005 | 120V AC Fan | \$23 |



LP GAS SPACE HEATERS



LP Gas Space Heaters

Empire space heaters are high quality heaters with a 10 year warranty on their combustion chambers. They require no electricity. The thermostats are powered by a tiny electrical generating device that gets its energy from the pilot light. This makes them ideal for an alternative energy home. With proper placement in a home you will need no backup furnace, which would require electricity to run blowers or circulating pumps. A 33,000 btu heater will heat about 1000 sq. ft. of well insulated space.

Empire heaters are AGA approved with all the latest safety devices required on gas appliances. All heater models must be shipped by freight (except for the DV-210 and DV-215). This will cost about \$75 from New England down to Virginia. These are in stock. Freight time is only a few days.

Console Heaters



Model RH-50C

Standard console heaters have an enameled metal front. Cool air enters the bottom vents and heated air comes out the top vents. Thermostatically controlled. The flue vent exits vertically or horizontally from

the rear. It is 4" or 5" depending on the model. (Visual flame heaters that have a one piece glass enclosure which allows you to see the flame as it heats are also available. Call for details.)

DIRECT VENT HEATERS

These heaters are easy to install. They are much like the standard console heaters, except they mount on an outside wall where the flue goes out the side of the building behind the heater. The heaters are more expensive, but there is no expense for flue pipe, or any need for a roof exit or chimney. They burn outside air which is both more efficient and causes less inside draught.



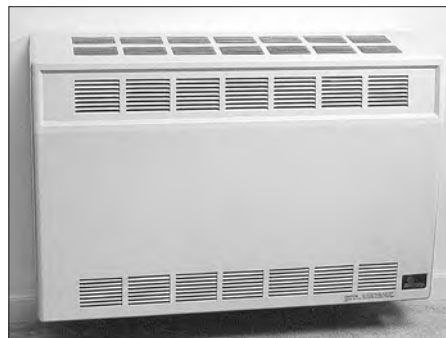
Model DV-210

New England Solar Electric, Inc.

Direct Vent Room Heater Specifications:

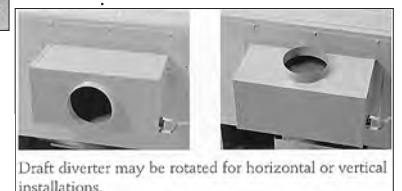
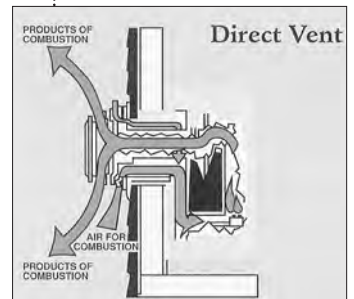
MODEL	DV-210-SG	DV-215-SG	DV-25-SG	DV-35-SG
Cabinet Color	Beige & Tan	Beige & Tan	Beige & Tan	Beige & Tan
Btu Input	10,000	15,000	25,000	35,000
Dimensions WxDxH	16.3"x9 4"x21.4"	20.2"x9.4"x24.9"	37"x11.5"x27.8"	37"x11.5"x27.8"
Shipping Weight	42 lbs UPS*	60 lbs UPS*	98 lbs Freight	101 lbs Freight
Temperature Control	Millivolt Thermostat with Positive Off			
Accessories				
Blower Kit	DVB-1 (\$145)	DVB-1	DRB-1 (\$149)	DRB-1
Vinyl Siding Vent Kit	DV-822 (\$49)	DV-822	DV-822	DV-822
Vent Extension Kit	Fits Walls from 13" to 19" (\$45)			
Minimum Clearances				
Top	12"	12"	48"	48"
Side	1"	1"	6"	6"
Wood Floor	0"	0"	4"	4"
Gas Inlet	1/2"	1/2"	1/2"	1/2"
Venting				
Min Wall Depth	4 1/2"	4 1/2"	4 1/2"	4 1/2"
Max Wall Depth	13"	13"	13"	13"
Vent Opening in Wall	6.25" dia.	6.25" dia.	7.5" dia.	7.5" dia.
Catalog Number	932-210	932-215	932-025	932-035
Price	\$589	\$659	\$819	\$889

*UPS at your own risk. Otherwise a freight carrier must be used. Call for details.



Model DV-35
(RH-35 Similar but stands on floor)

Vent Outlets for
Console Room
Heaters



Draft diverter may be rotated for horizontal or vertical installations.

Console Flue Vented Room Heater Specifications:

MODEL	RH-25	RH-35	RH-50C	RH-65C
Cabinet Color	Beige	Beige	Beige	Beige
Btu Input	25,000	35,000	50,000	65,000
Dimensions WxDxH	37"x11.5"x26"	37"x11.5"x26"	34"x16"x29 6"	34"x16"x29 6"
Shipping Weight	84 lbs Freight	88 lbs Freight	124 lbs Freight	142 lbs Freight
Temperature Control	Hydraulic Thermostat			
Accessories				
Blower Kit	DRB-1 (\$149)	DRB-1	FRB-3 (\$129)	FRB-3
Metal Floor Pad	RH-425 (\$59)	RH-425	RH-425	RH-425
Minimum Clearances				
Top	48"	48"	55"	55"
Side	6"	6"	6"	6"
Wood Floor	0"	0"	0"	0"
Gas Inlet	1/2"	1/2"	1/2"	1/2"
Flue Size	4"	4"	5"	5"
Catalog Number	930-025	930-035	931-050	931-065
Price	\$679	\$739	\$759	\$869

Call Toll Free: (800) 914-4131

CRYSTAL COLD GAS REFRIGERATORS and FREEZERS

Now there are larger gas refrigerators and freezers available. These propane refrigerators and freezers are built by Amish craftsmen for the Amish community and others in need of quality refrigeration. These dependable heavy duty units are the largest made in the USA. We have been getting excellent feed-back on Crystal Cold refrigerators from our customers. Now they offer freezers as well as refrigerators. Also available: 17 & 21 Ft³ refrigerator only and 18 & 22 Ft³ freezer only. Please call for details.



CRYSTAL COLD SPECIFICATIONS AND PRICES							
Model:	CC11	CC15	CC18	CC18SS	CC19-R/F	CC21R/F	BF15F
Type:	Refrigerator/ Freezer	Refrigerator/ freezer	Refrigerator/ Freezer	Refrigerator/ Freezer	Refrigerator/ Freezer	Refrigerator Freezer	Freezer/ Upright
Size							
Total (cu/ft):	11	15	18	18	19	21	15
Fridge Interior H"xW"xD":	36.25x19.5x20.25	33.5x24x24.5	38.5x24.5x24.5	38.5x24x24	39.5x25.75x25	39.5x25.75x26.5	n/a
Freezer Interior H"xW"xD":	13.5x18.25x20.25	14x22x24	14x22x24	14x22x24	14x23.75x24.5	16.75x23.75x26	46x23x23.75
Operation:	Propane	Propane	Propane	Propane	Propane	Propane	Propane
LP Gas Use							
Gal per Week:	2	2	2.5	2.5	2.5	2.5	4.2
CGA/AGA Approved:	No	No	No	No	No	No	No
Features:							
Reversible Doors	Yes	Yes	Specify L or R	Specify L or R	Yes	Specify L or R	No
Batt Interior Light	Yes	Yes	Yes	Yes	Yes	Yes	No
Front Push-Button Ignitor:	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flame Indicator	Yes	Yes	Yes	Yes	Yes	Yes	No
Color:	White Only	White, Bisque	White, Bisque	Stainless Steel w/Black Cabinet	White, Bisque & SS	White, Bisque & SS	White Only
Castors:	Yes	Yes	Yes	Yes	Yes	Yes	No
Dimensions:							
H"xW"xD"	63x23.63x30	63.5x28.5x34.5	65.5x28.5x34.5	65.5x28.5x34.5	66x30x36	69.5x30x37	60x42x28.5
Shipping Weight (lbs):	269	298	324	324	270	325	324
Warranty							
Free on Cooling Unit:	3 yr	3 yr	3 yr	3 yr	3 yr	3 yr	3 yr
Item No:	900-011	900-015	900-018	900-018S	900-019	900-021	900-015F
Price:	\$1649	\$1875	\$1999	\$2125	\$2125 (\$2189 SS)	\$2249 (\$2299 SS)	\$2399
Approx. Freight to NE: (Please call for freight quote.)	\$175	\$200	\$225	\$225	\$175	\$225	\$225

Serval™

by Dometic

LP Gas Refrigerator

900-400 Model RGE-400 \$1299

Tropical climate cooling.
Piezo-spark starter.
Front access controls.
Thermo-electric safety valve
American Gas Association
Approved

SPECIFICATIONS

Total volume: 7.5 cu.ft.
Freezer volume: 1.5 cu.ft.
Weight: 167 lb.
Shipping weight: 183 lb.
Fuel: LP Gas
Approximate fuel consumption
per week: 7 lbs (2 gal)
Color: White or Bisque
Hinges: On the right [Can be switched to left]
Dimensions: 61.5"H x 23.25"W x 26"D
Warranty: 1 year [Extended Warranty Available from Serval]



The Dometic Model RGE-400 is one of the most efficient gas refrigerators available. It runs on propane and needs no other power whatsoever. Dometic sells this refrigerator under the Serval name (They bought the rights to the old name, but the refrigerator is quite different.) The RGE-400 is manufactured in Sweden and imported to the USA. It is available in white and bisque.

We sell over 70 Dometics each year. We get many thank you notes on this unit because it is lighter and more compact than the old Servels (pre-1963) and it uses about one quarter the gas. It will cool in the hottest of climates. The freezer section has a separate door and is a true deep freezer even in the hottest summer weather. You can freeze and keep vegetables from the garden or fish or meat from the woods or the supermarket. Since gas freezers are expensive, most customers who need more freezer space - just buy a second Dometic.

The Dometic requires no venting. Its small efficient flame is an incredible improvement over the old Servels. All controls are on the front of the unit as they should be.

The Dometic is shipped freight pre-paid to you from Ohio (about \$125-\$150 in New England). Once in a while the shipping will be an additional \$25 in the case where the long distance freight company has to transfer the refrigerator to a local freight company. Delivery usually takes about a week to 10 days from time of order. The RGE-400 is almost always in stock, but if you have a critical delivery time call well in advance of desired delivery date especially in the Spring.

New England Solar Electric, Inc.

Falks Gas Lamp

909-002	Single for Wall Mount	\$99
909-004	Double Ceiling Fixture (Includes Two Lamps)	\$199
909-005	Double Wall Fixture (Includes Two Lamps)	\$179
909-003	Replacement Mantles, each	\$8
909-011	Replacement Glass Globes	\$15

We would rather see you use a PV system and efficient DC or AC lighting. However, we still have many cus-



tomers who need gas lights for a backup lighting system. Falks gas lamps are made in Canada and are quite a refinement over the Humphrey lamps. They have gold trim with a white and clear globe. The lamp includes a reflector (not shown in the picture below). It can be plumbed both outside and inside the wall. All needed gas pipe adapters are included. The lamp extends 10" from the wall, is 6" wide and 7 1/2" high.

Humphrey Gas Light

909-001	Specify Color. See Below	\$79
	6 or more, each	\$69
909-009	Chrome or Brass	\$109
909-003	Replacement Mantles, each	\$8
909-010	Opalite Pendant	\$49
	Hang 1 to 3 Lights from Ceiling	
909-011	Replacement Glass Globes	\$15



The original gas lamp is now back. The Humphrey has been acquired by yet another company and are available once again. We have Pebble Gray, Almond and Walnut in stock. Other colors are available.

Call Toll Free: (800) 914-4131

DC REFRIGERATORS AND FREEZERS



DC Refrigerators and Freezers

900-050R	Fridge DCR50	1.8 ft³	\$699
900-050F	Freezer DCF50	1.8 ft³	\$699
900-165R	Fridge DCR165	5.8 ft³	\$1149
900-225R	Fridge DCR225R	8.1ft³	\$1249
900-165F	Freezer DCF165	5.8 ft³	\$1149
900-225F	Freezer DCF225	8.1ft³	\$1249

SunDanzer makes highly efficient DC refrigerators and freezers that have exceptionally low energy consumption requiring smaller, less expensive power systems.

High quality construction provides excellent reliability and long life. Super-insulated cabinets feature 4 1/3" of polyurethane insulation with powder-coated galvanized steel exterior and aluminum interior. A zero maintenance, brushless, thermostatically controlled DC compressor operates on 12 or 24 VDC. The unit automatically senses and operates on the supplied voltage. A patented low-frost system reduces frost and moisture build-up for low maintenance. These chest-style refrigerators and freezers are easy to clean using the drain hole at the bottom of the unit.

Low energy consumption is the key that allows SunDanzer refrigerators and freezers to be cost effectively powered from solar, wind or batteries. This technology allows electric refrigeration in remote locations where it was previously unavailable or prohibitively expensive.

SunDanzers are shipped freight pre-paid to a business from El Paso, TX (about \$150-\$200 to New England). If you want home delivery add \$25 to \$35 to the freight cost. Delivery usually takes about a week to 10 days from time of order. Sundanzers are almost always in stock, but if you have a critical delivery time call well in advance of desired delivery date especially in the Spring.



DCR or DCF50

Physical and Electrical Specifications						
Model:	DCR50 Refrigerator	DCF50 Freezer	DCR165 Refrigerator	DCF165 Freezer	DCR225 Refrigerator	DCF225 Freezer
Capacity:	1.8 ft ³	1.8 ft ³	5.8 ft ³	5.8 ft ³	8 ft ³	8 ft ³
Input Voltage:	10 VDC to 31 VDC					
Power (typical-max)	---	---	40 watts - 80 watts			
Fuse:			15 amp			
12V	---	---	7.5 amp			
24V	---	---				
Ambient Temp. Range:			10° to 109° F			
Refrig. Temp. Range:			30° to 48°F			
Freezer Temp. Range:			0° to 23°F			
Dimensions:	26.5"w x 23"d x 30.5"h		36.8"w x 26.2"d x 34.5"h		46.9"w x 26.2"d x 34.5"h	
Weight:	75 lbs		120 lbs		140 lbs	

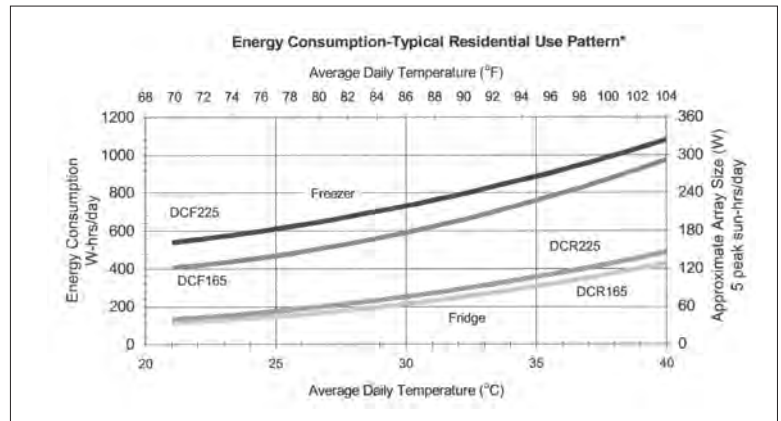


DCR or DCF 225

Features:

- 12 or 24 VDC with low voltage disconnect for battery protection (120 VAC power supply available)
- Automatic voltage selection
- Environmentally friendly CFC-free refrigerant (R-134a)
- Rugged scratch resistant galvanized steel exterior
- Easy to clean aluminum interior
- Patented low-frost system
- Automatic control with adjustable thermostat
- Baskets for food organization

Daily Energy Consumption (No door openings, refrigerator 38°F, freezer +10°F)			
Ambient temperature	70°F	90°F	110°F
Refrigerator DCR50		114 watt-hrs	
Freezer DCF50		280 watt-hrs	
Refrigerator DCR165	77 watt-hrs	168 watt-hrs	348 watt-hrs
Refrigerator DCR225	90 watt-hrs	198 watt-hrs	393 watt-hrs
Freezer DCF165	272 watt-hrs	441 watt-hrs	766 watt-hrs
Freezer DCF225	360 watt-hrs	532 watt-hrs	817 watt-hrs



Premier Gas Ranges

Peerless-Premier Gas Ranges

906-001 Please Select Model from Below

Peerless now offers two specific types of gas ranges specifically for off-grid or otherwise alternative energy homes. The "T" models have a fully electronic 110V ignition system which allows both the top burners and the oven to be lit with a match if the power is off. The "B" models utilizes 8 "AA" batteries for spark ignition. Neither type utilizes a glow bar which requires a lot of electrical energy to operate. For the "T" models, if your inverter is "on", just turn on the oven or top burner and it lights automatically, using very little power. If your inverter is in stand-by, simply start the top burners or oven with a match or barbecue lighter. Or turn on a light and then turn your range on. The "B" battery spark models require no electrical



P36T148BP

power. This is one of the very few brands that allow you to use the oven without electricity.

There are 12 different battery spark models and 12 different thermocouple system models available (including 5 Pro-Series models). Available colors are white, biscuit or black. They are shipped freight prepaid from the factory in Illinois. Freight charges are \$150 to a business address or \$200 to a home address.

The best part is that Peerless ranges have an excellent reputation for very high quality. They come with a lifetime warranty on top burners and have many standard quality features:

- Recessed Porcelain Cooktop
- Universal Valves (easily convert to LP gas)
- Push-to-Turn, Blade Type, Burner Knobs
- Keep Warm 150° Thermostat
- Permanent Markings On Control Panel Inlay
- A Full 25" Oven in 30" & 36" Ranges
- Oven Indicator Light on 30"
- Lift-Off oven Door
- Closed Door Variable Broil
- Color Co-ordinated Door Handles
- Silicone Oven Door Seals
- Oven Fully Insulated-Blanket Type
- Roll Out Drop Door Broiler
- Porcelain Smokeless Broiler Pan and Tray
- Four Leg Levelers



TJK-2400P



TMK-2400P



TMK-249WP



BLK-100WP



P30T3202P

Peerless-Premier Gas Ranges for Alternative Energy Customers

Colors: OP=all white; WP=white w/black trim; TP=biscuit w/black trim; BP=all black; SS=stainless steel w/black trim
 Burners: Selected models (**) have one 14,000btu power burner, two 8100btu high efficiency and one 600-5000btu simmer top burner on LP gas. Oven 17,000btu on LP gas. (***-add 1-8100btu and 1-11,000btu burner)

Oven Dimensions: 24" models-19"Wx15"Hx18"D; 30"and 36" models-25"Wx15"Hx18"D

Dimensions: All models 36"H (not including back-splash) x 26"D

	Size	Color	Burners	Door	Backguard	Features	Price
"B" Models (8 AA Battery Ignition)							
BAK100	20"	OP/TP/BP	4-9100btu	Std	4"		OP \$599; TP/BP \$539
BCK100	24"	OP/TP/BP	4-9100btu	Std	4"		OP \$599; TP/BP \$609
BFK100	30"	OP/TP/BP	4-9100btu	Std	4"		OP \$549; TP/BP \$569
BFK5S9	30"	WP/TP/BP	5-9100btu	Window	10"	Griddle w/Cover	WP \$719; TP/BP \$729
BLK100	36"	OP/TP/BP	4-9100btu	Std	4"		OP \$689; TP/BP \$699
BLK5S9	36"	WP/TP/BP	5-9100btu	Window	10"	Griddle w/Cover	WP \$859; TP/BP \$869
Thermocouple Models (120VAC Spark Ignition)							
TJK2400P	24"	OP	4-9100btu	Window	10"w/Clock		\$849
TJK340BP	24"	BP	** Sealed	Window	10"w/Clock		\$879
TMK2400P	30"	OP	** Sealed	Window	10"w/Clock		\$749
TMK340BP	30"	BP	** Sealed	Window	10"w/Clock		\$759
TFK249WP	30"	WP	5-9100btu	Window	10"w/Clock	Griddle w/Cover	\$799
TLK240WP	36"	WP	4-9100btu	Window	10"w/Clock		\$829
TLK849BP	36"	BP	5-9100btu	Window	10"w/Clock	Griddle w/Cover	\$959
Pro-Series (120VAC Spark Ignition)							
P24T3202P	24"	SS-B	4-** Sealed	Window	10" SS	Continuous Top Grates	\$1349
P30T3102P	30"	SS-B	4-** Sealed	Window	1 1/2" SS	Continuous Top Grates	\$1349
P30T3202P	30"	SS-B	4-** Sealed	Window	10" SS	Continuous Top Grates	\$1349
P36T3282P	36"	SS-B	6-*** Sealed	Window	10" SS	Continuous Top Grates	\$2029
P36T148BP	36"	SS-B	6-*** Sealed	Std	10"w/Clock	Continuous Top Grates	\$1569

DC LIGHTING

Montana Light DC Lighting Fixtures

All of the fixtures and custom designed ballasts and sockets listed on pages 70 to 72 are manufactured by Montana Light. They have been designing and manufacturing DC lighting for at least 20 years. It was a great step forward when we started to offer Montana Light equipment over what was then available. These fixtures start instantly and without the annoying flicker the old style fixtures exhibited. Many of their ballasts power different size bulbs while remaining at least 95% efficient for each size. This is a real convenience for those of you who might change your mind about what size light is needed in any given space. We have had great success with this lighting equipment. If you want to use DC lighting, these are excellent fixtures to use.

Lamp Notes

When a bulb is showing signs of hard starting it needs to be replaced. If you notice black areas around the base, or a violet glow at the base of the glass for more than a few seconds while starting, its time to replace the bulb.

Ballast and socket damage at end of bulb life can be prevented by installing a small fuse at the fixture. We now include a 2 amp auto blade fuse and holder with all our ceiling fixtures. See our DC fuses on page 55.

All products from Montana Light have a **one year limited** warranty. See page 72 for installation information and other tips for using DC compact fluorescent lights.

12 Volt and 24 Volt DC Compact Fluorescent Bulbs

S/E Fixtures

See Full Size Chart on page 79



These fixtures consist of an electronic DC ballast and a replaceable compact fluorescent bulb. S/E stands for "Single Loop/Electronic" which means the bulb has one loop and is made to work with an electronic ballast. The ballast is fitted with a standard screw base and can be used in lamps or fixtures powered by 12 or 24 volts DC. They start instantly every time. They will also function to at least 0°F. However low voltage (under 12V or 24V) and/or frequent on-off cycles will shorten their life. The bulb has a

rated life of 10,000 hours. The ballast should last 45,000 hours. The S/E bulb comes in 5, 7, 9 and 13 watt sizes. The same ballast is used for all four bulb wattages, so bulbs can be interchanged in the future.



831-405	S/E Ballast/Bulb 5w 12v	\$26
831-407	S/E Ballast/Bulb 7w 12v	\$26
831-409	S/E Ballast/Bulb 9w 12v	\$26
831-413	S/E Ballast/Bulb 13w 12v	\$26
831-505	S/E Ballast/Bulb 5w 24v	\$27
831-507	S/E Ballast/Bulb 7w 24v	\$27
831-509	S/E Ballast/Bulb 9w 24v	\$27
831-513	S/E Ballast/Bulb 13w 24v	\$27

S/E Replacement Tubes

These tubes can be used either as replacement tubes for our DC compact fluorescent bulbs or for use in your own fixtures using the S/E sockets listed below and ballasts listed on page 78.

804-105,107,109,113 5, 7, 9 or 13 watts \$7.00



See Page 75 for Full Size Outlines

T/E and D/E Fixtures

T/E fixtures are similar to the S/E fixtures. They consist of an electronic DC ballast and a replaceable compact fluorescent bulb. The ballast is fitted with a standard screw base and can be used in lamps or fixtures powered by 12 or 24 volts DC. They start instantly every time. They will also function to at least 0°F. However low voltage (under 12V or 24V) and/or frequent on-off cycles will

shorten their life. The bulb has a rated life of 10,000 hours. The ballast should last 45,000 hours.



830-013	T/E Ballast/Bulb 13w 12v	\$28
830-018	T/E Ballast/Bulb 18w 12v	\$29
830-213	T/E Ballast/Bulb 13w 24v	\$28
830-218	T/E Ballast/Bulb 18w 24v	\$29

T/E Replacement Tubes

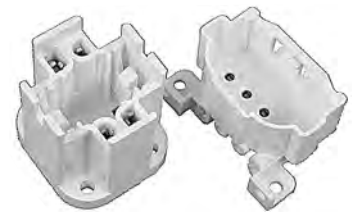
Similar in use as the S/E listed on left.

804-313	T/E Bulb 13 Watts	\$8.00
804-318	T/E Bulb 18 Watts	\$10.00



Compact Fluorescent Tube Sockets

These tube sockets can be used to make your own compact fluorescent fixtures using the tubes and ballasts listed in this catalog. An existing fixture could be retrofitted or a new one designed. The ballast can be mounted at a distance from the socket and out of sight from the tube.



832-001	S/E Socket 5, 7, 9 or 13 watt	\$4
832-002	T/E Socket 13 watt	\$4
832-004	T/E Socket 18 watt	\$4

COMPACT FLUORESCENT and LED

12 Volt and 24 Volt Integrated DC Compact Fluorescent Bulbs

Montana Light has a line of integrated compact fluorescent bulbs. Integrated means that the tubes are non-replaceable. The advantages of this arrangement are smaller and less expensive bulbs. We currently stock the T/E versions in 2700°K bulbs both in 12 and 24 VDC. See pg 80 for Full Size Outlines.



- 834-1213 T/E Integrated Bulb 12V 13W \$25
- 834-1218 T/E Integrated Bulb 12V 18W \$25
- 834-1223 T/E Integrated Bulb 12V 23W \$25

- 834-2413 T/E Integrated Bulb 24V 13W \$25
- 834-2418 T/E Integrated Bulb 24V 18W \$27
- 834-2423 T/E Integrated Bulb 24V 23W \$27

Very High Efficiency 12 and 24 Volt LED Lights

LED stands for "light emitting diode" Consisting of six ultra high output LEDs, this light produces an unbelievable amount of light for the power it uses. The light is ideal for reading or for a work light at close distances. The LED light requires positive voltage at its center pin and negative voltage at the threads. Dimensions: 2" dia., 2-1/2" long (including Edison base).



- 840-100 LED Light, 6 LEDs, 12/24V \$16
(12V-40mA-0.5W 24V-50mA-1.2W)
- 840-101 LED Light 12 LEDs, 12V \$29
(100mA-about 1.2W)
- 840-102 LED Light 12 LEDs, 24V \$29
(90mA-about 2W)

High Efficiency, High Brightness 12V LED Lights

This LED light consists of just three LEDs, but makes more than four times the light of the six LED light and has an expected life of over 100,000 hours. This LED lamp has a wide dispersion angle, allowing it to actually light up an area rather than just a small spot. It requires positive voltage at its center pin and negative voltage at the threads. Dimensions: 2" dia., 2-1/2" long (including Edison base).



- 840-106 LED Light 3 LEDs 12V Soft White \$39
(330mA-about 4W)

Under Cabinet LED Lights

High efficiency, high brightness LEDs are mounted in thin metal enclosures for under-counter use. This is the perfect use for LED lighting as the LEDs deliver a lot of light in a small space. The smaller fixture (3"x2"x1/2") draws about 200mA at 12VDC (about 2.5W). The larger fixture (6"x2"x1/2"), with more heat dissipating ability, draws 350mA at 12VDC (about 4W) and produces considerably more light.



- 840-107 Mini-Lux Under-Cabinet Fixture \$29
- 840-108 Mighty-Lux Under-Cabinet Fixture \$36
- 840-110 Mighty-Lux w/ Switch \$43

DC Coilight Compact Fluorescents

This a new line of integrated compact fluorescents by Montana Light. Integrated means that the bulb is not replaceable. The advantage of these lights is that they are somewhat smaller than the integrated compact fluorescents listed above. They are available in both 12 and 24 VDC. The color temperature is the same as all our other compact fluorescents: 27K °K (soft white).



- Size: 5 3/4" Long by 2 1/4" Dia. (13 watt bulb)
- 835-1213 Coilight Integrated Bulb 12V 13W \$21
 - 835-2413 Coilight Integrated Bulb 24V 13W \$22

Globe Ceiling Fixture

This "Globe" type enclosure houses a 13W T/E tube in a 5" diameter base fitted with a 6" frosted white glass globe. The ballast is mounted in the base.



- 840-005 12V 13W \$49
- 840-006 24V 13W \$49

Under Cabinet Fixtures

The "Under Cabinet" fixture is available in 15 watt, 12 or 24 volt versions. It has a squared off front diffuser edge. A rocker switch can be added for \$5. Dimensions: 18" long, 4.5" deep, 2" thick

- 840-017 Squared Edge 15W 12V \$39
- 840-018 Squared Edge 15W 24V \$39



DC COMPACT FLUORESCENT LIGHT FIXTURES

DC Compact Fluorescent Fixture and Ballast Installation Notes

Following are a few tips for achieving the longest bulb and ballast life:

Low Voltage

The number one problem a DC ballast has is low voltage. A 12 volt DC ballast may require up to 10 times the operating current to start the lamp. If the wire is too small or the voltage is too low, the lamp will not be able to get the necessary current to start and then a low voltage condition will exist. The lamp will work fine for a while but will soon start showing signs of failure.

If the lamp fails to start instantly it will place a high current load on the ballast.

If this load remains too long it can over heat the ballast and cause premature ballast failure.

End of Lamp Life

When a bulb is showing signs of hard starting it needs to be replaced. If you notice black areas around the base, or a violet glow at the base of the glass for more than a few seconds while starting, its time to replace the bulb.

Fluorescent bulbs do not like to be turned on and off frequently in a short amount of time. The 10,000 hour life rating is based on a minimum of three hours on time. If the bulb is on for shorter periods of time, its life will be reduced. Areas where lights are on for only a few minutes will use up bulbs much faster than when they are used for a longer period of time. We recommend using quartz halogen or even incandescent bulbs where lights are being constantly turned on and off.

DC Ceiling Fixtures

Our ceiling fixtures are ideal wherever decorative and energy efficient lighting is needed: bath, kitchen, hallway, etc. They have a low profile lens suitable for either ceiling or wall mount. The high impact white acrylic lens delivers a pleasing shadow-free light. We now stock all combinations of these ceiling lights for immediate delivery.

Our basic ceiling fixture houses one S/E bulb with its associated ballast. It can have either a "Drum" or "Mushroom" type cover. The included ballast can efficiently power any of the four S/E bulb sizes: 5W, 7W, 9W or 13W. Please specify which size you would prefer.

The second version of this ceiling fixture features two S/E bulbs and ballasts for twice as much light. Again, the included ballasts can efficiently power either a 5W, 7W, 9W or 13W tube: two tubes per fixture in any combination. With the proper switching arrangement, this fixture can produce two levels of light.

Both fixtures come in either 12 volt or 24 volt versions as specified by part number. A 120 volt version of this fixture is also available.

Bulb life is 10,000 hours; ballast life is 45,000 hours. They come with a one year guarantee, but must be used as directed in the enclosed operating instructions. (See side bar.)

A pull chain can be added to any fixture for \$5. Dimensions: 11" diameter; 3" deep.

- | | | |
|----------------|---|-------------|
| 840-352 | 12 Volt Single Bulb Fixture | \$52 |
| | Mushroom or Drum Cover; 5,7,9 or 13W Bulb | |
| 840-354 | 24 Volt Single Bulb Fixture | \$52 |
| | Mushroom or Drum Cover; 5,7,9 or 13W Bulb | |
| 840-402 | 12 Volt Double Bulb Fixture | \$68 |
| | Mushroom or Drum Cover; Specify bulb sizes. | |
| 840-404 | 24 Volt Double Bulb Fixture | \$68 |
| | Mushroom or Drum Cover; Specify bulb sizes. | |



Montana Light DC Ballasts

Light It Technology of Montana specializes in every type of DC lighting. Most of our DC fixtures are made by them. Now they have come out with their own line of DC ballasts. These ballasts were designed to operate with the new S/E and T/E electronic tubes. All LIT ballasts start instantly with no flicker and operate at high frequency without noise or radio interference. All LIT ballasts have a one year warranty. These ballasts should last for 45,000 hours.

Low Wattage Ballasts



These ballasts now power 5 through 13 watt tubes. They only draw the current necessary to power each wattage. In other

words they are about 98% efficient across their operating range.

Dimensions: Length 2", Width 1 7/8", Height 1"

- | | | |
|-----------------|-----------------------------------|-------------|
| 854-1213 | 12V, 5W-13W, S/E & T/E | \$25 |
| 854-2413 | 24V, 5W-13W, S/E & T/E | \$25 |

High Wattage Ballasts

The high wattage ballasts will now power 18 to 40 watt tubes and 18 and 26 watt bulbs. Efficiency for all wattages is 98%.



Dimensions: Length 3", Width 1 3/4", Height 1 1/4"

- | | | |
|-----------------|---------------------------|-------------|
| 854-1240 | 12V, 18W-40W Tubes | \$39 |
| 854-2440 | 24V, 18W-40W Tubes | \$39 |

Thin-Lite DC LED Fixtures

Thin-Lite has come out with a new line of DC LED fixtures. These are the nicest LED fixtures we've seen so far. The color rating is neutral white (4000K) and the color rendering index, CRI, is 80. They all work on 8 to 30 VDC, and have two switchable output light levels, 30% and 100%. All fixtures have built-in switches which determine the output level as well as on/off. You can set the switch to the level you want and then control the fixture with a wall switch. And best of all, these fixtures deliver a pleasing light output, unlike much of the LED lighting available today. LED life is rated at 100,000 hours and they all have a three year warranty. These fixtures cost more than their old fluorescent equivalents, but they will be much less expensive in the long run, if for nothing but their power saving characteristics alone. Needless to say, no more replacing tube and no more flicker.

- 811-109 LED109CP** 400/1600 lumens **\$69**
 8-30 VDC; 2.88/9.6 Watts
 9.5" Dia. x 1.75" Deep 48 LED's
 (Similar to the old 108's)



- 811-612 LED612P** 480/1600 lumens **\$75**
 8-30 VDC; 2.88/9.6 Watts
 15" x 5.53" x 1.57" 48LED's



- 811-616 LED616P** 720/2400 lumens **\$95**
 8-30 VDC; 4.32/14.4 Watts
 20.625" x 5.53" x 1.57" 72 LED's



- 811-130 LED130WP** 480/1600 lumens **\$69**
 8-30 VDC; 2.88/9.6 Watts
 12" x 5.375" x 1.75" 48 LED's
 (Similar to the old 182's, but thinner)



- 812-134 LED134WP** 720/2400 lumens **\$89**
 8-30 VDC; 4.32/14.4 Watts
 18" x 5.375" x 1.75" 72 LED's
 (Similar to the old 186's, but thinner)



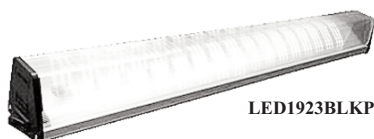
- 812-1913 LED1913BKP** 240/800 lumens **\$49**
 8-30 VDC; 1.44/4.8 Watts
 13.25" x 2.5" x 2.5" 24 LED's
 (Similar to the old 191's)



- 812-1918 LED1918BKP** 315/1050 lumens **\$65**
 8-30 VDC; 2.16/7.2 Watts
 18.25" x 2.5" x 2.5" 36 LED's
 (Similar to the old 193's)



- 812-1923 LED1923BKP** 480/1600 lumens **\$75**
 8-30 VDC; 2.88/9.6 Watts
 23.25" x 2.5" x 2.5" 48 LED's



Thin-Lite Replacement Ballasts

For those that need them, we still carry replacement ballasts for the older style Thin-lite fixtures. You can also use these ballasts to convert AC fluorescents to DC. Other DC ballasts can be found on the previous page. Dimensions: 5-1/2" long, 1-1/4" wide, 7/8" high.

- | | | |
|----------------|------------------------|-------------|
| 850-015 | 15W 12V Ballast | \$24 |
| 850-020 | 22W 12V Ballast | \$25 |
| 850-030 | 30W 12V Ballast | \$25 |
| 850-040 | 40W 12V Ballast | \$30 |
| 851-015 | 15W 24V Ballast | \$40 |
| 851-020 | 20W 24V Ballast | \$40 |
| 851-030 | 30W 24V Ballast | \$40 |
| 851-040 | 40W 24V Ballast | \$46 |



Replacement Bulbs
 For those that need them, we still carry replacement tubes for the older style Thin-lite fixtures.

Thin-Lite 191/291 CF8T5/CW

- | | |
|------------------------------------|------------|
| 819-191 | \$5 |
| Thin-Lite 193/293 CF15T8/CW | |
| 819-193 | \$5 |

The F8 and F15 tubes are "regular" fluorescent tubes, with a cool white color temperature.



190/290 Series Tube

Thin-Lite 182/282 F18PL

- | | |
|--------------------------------|-------------|
| 819-182 | \$16 |
| Thin-Lite 186/286 F39BX | |
| 819-186 | \$22 |

The 180/280 series tubes are the "PL" single loop type bulb, which are not readily available. Their color temperature tends towards "daylight". These bulbs are expensive, but very long lasting. Though we've been selling the 180/280 series Thinlite for over 15 years, we sell very few replacement tubes.



180/280 Series Tube

Replacement Lenses

In case you should damage the plastic covers on your ThinLite fixtures.

Thin-Lite 191/291

- | | |
|--------------------------|-------------|
| 818-191 | \$8 |
| Thin-Lite 193/293 | |
| 818-193 | \$10 |
| Thin-Lite 182/282 | |
| 818-182 | \$8 |
| Thin-Lite 186/286 | |
| 818-186 | \$15 |

DC LIGHTING

MR-16 Quartz Halogen Floodlight

MR-16's are floodlights, 2" in diameter. They produce at least 50% more light than the same wattage DC incandescent. They deliver such bright directed light, we actually use them in mountain bike headlights for night riding in the woods! One light hanging above a table, or one light in a reading lamp are good applications. These lights have bi-pin bases. You can solder onto the pins, but we recommend buying the adapter to convert to a standard screw base.



QH MR-16 Bulb

802-003	MR-16 Bulb 12V 20 watt	\$3.00
802-004	MR-16 Bulb 12V 35 watt	\$3.00
802-009	Screw Base Adapter	\$6.00

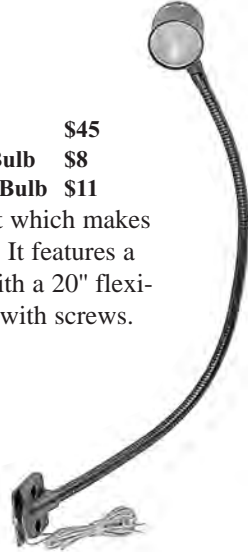
MR-16 Adapter



CO-PILOT LAMP

802-001	20" long 12V 5 watt	\$45
802-002	5W 12V Replacement Bulb	\$8
802-007	10W 12V Replacement Bulb	\$11

This is an automotive map light which makes an excellent reading or task light. It features a 12V DC 5 watt Halogen lamp, with a 20" flexible neck and a mounting bracket with screws. Very good for reading in bed.



MR-16 LED Floodlight

LED MR-16 Bulb



MR-16 LED floodlights are 2" in diameter, the same physical size as the QH type. However, they produce the same amount of light while using only 4 watts, rather than 20

watts. The ones we offer are warm white (3200K), a very pleasing light especially for LED's. They have a 60 degree dispersion pattern and the same bi-pin bases as the QH type. Even though they operate on 12 VDC, the pins are not polarized: they can be inserted into the adapter either way. The best part is that their expected life is over 100,000 hours. Use the same screw base adapter as the "regular" MR-16's.

802-008	MR-16 LED 12V 4 watt	\$9.00
802-009	Screw Base Adapter	\$6.00



LED MR-16 Bulb in MR-16 Adapter

DC Incandescent Light Bulbs With standard screw base

These DC bulbs give you about the same light for the same wattage as conventional 120V AC incandescent light bulbs. They will work in conventional lamps and light fixtures, as long as any switch used is a clicking type switch, not a silent mercury switch. Because of their inefficiency, they should be used only where light is needed for a short period of time (a closet or hallway). Don't use these for reading lights.

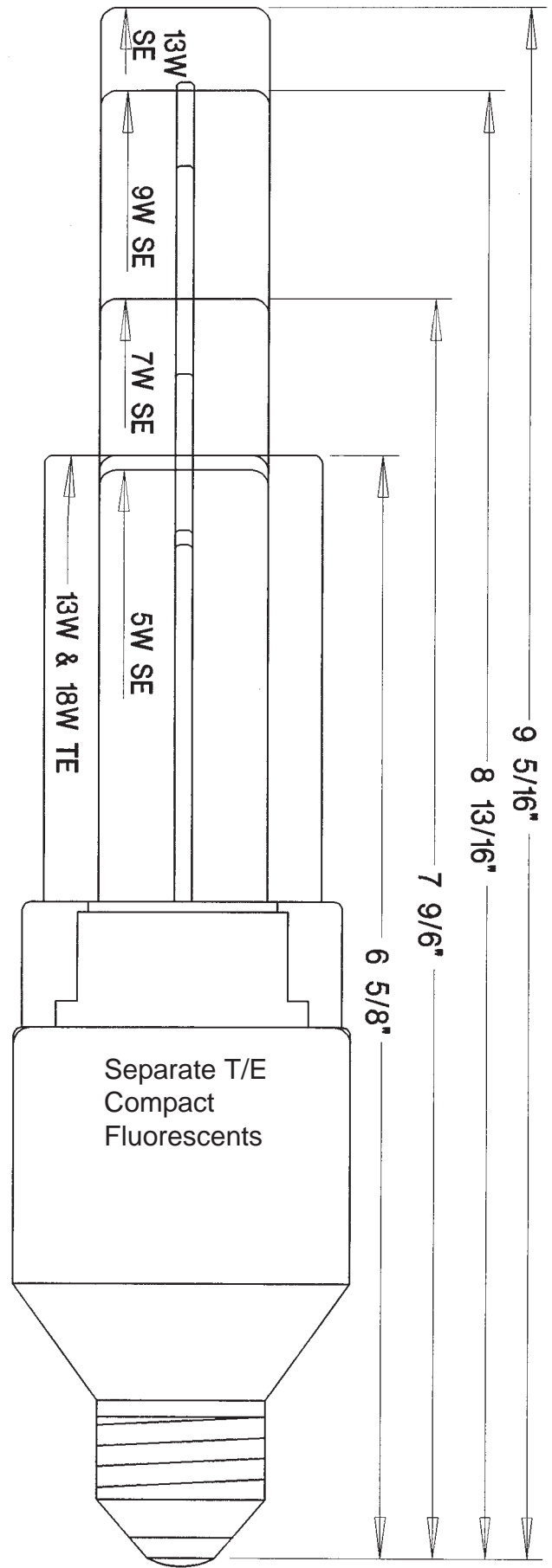
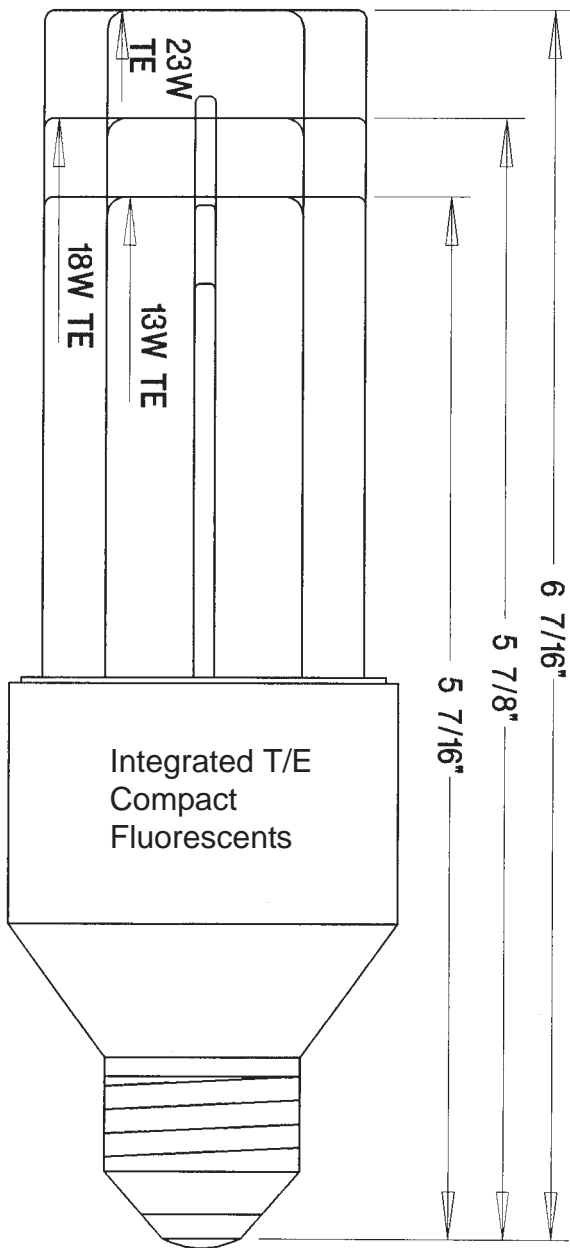
820-025	12 volt 25 watt 275 lumens	\$4.25
820-050	12 volt 50 watt 790 lumens	\$4.00



DC Compact Fluorescents

Full Size Charts

(Fixtures on page 70 & 71)



TERMS AND CONDITIONS

New England Solar Electric Inc. is **NOT A STORE FRONT**. Please make an appointment for consultation or pick-up of goods. We will spend up to two free hours of consultation with you for your PV system design, by appointment, here. Additional consultation time is \$35 per hour.

● **PRICES AND SPECIFICATIONS MAY CHANGE WITHOUT NOTICE.**

● **WE WILL MATCH OR BEAT MOST ANY SALE PRICE ON ANY PV MODULE, TRACE INVERTER, SERVEL REFRIGERATOR, TROJAN BATTERY OR ANY OTHER PRODUCT WE SELL.**

● **WE STOCK MOST OF THE ITEMS IN THIS CATALOG. WE HAVE BUILT OUR BUSINESS ON PROMPT SHIPMENT OF ORDERS.**

This catalog is designed to be concise and inexpensive to print. This keeps our costs down, which allows us to give you the best pricing. There is a lot of information in a small space. Additional information is best obtained by calling New England Solar Electric Inc. We have the information that will help you balance different components to eliminate mistakes and trade-ins. We can also tell you which components are more efficient and will run which appliances.

This catalog is constantly updated with new equipment and prices. Unfortunately, specifications and prices may change without any notice. If you see a price reduction in another catalog, or a new model listed, please call us. We will probably have the change.

Due to variability of local conditions, materials, site, loads, and installation, New England Solar Electric does not guarantee the output or performance of a solar electric system. The original manufacturer of each component in a system or in this catalog may provide limited warranties of performance specifications of its product. New England Solar Electric Inc. makes no representations, warranties, or guarantees, expressed or implied, unless set forth in writing executed by us, and you may only rely on the original manufacturer's limited warranty, if any.

Solar electricity is much more expensive than public utility service. The size solar electric system sold by New England Solar Electric Inc. cannot be expected to power a conventional household.

Please request the warranty policy for any piece of equipment. Any warranty repairs are normally made by the original manufacturer. Details and instructions should be in the box. Please do not return goods here without calling first. It will only delay the warranty process and increase the shipping costs. We reserve the right to charge a 15% restocking fee on any item returned. We try to be reasonable about this, and make an effort to exchange goods for credit on other goods. You will be responsible for shipping costs. Special order items may not be returnable for credit. Please call for return authorization before you return any item for any reason.

PERSONAL CHECKS must clear before we can ship you your order. **BANK CHECKS, MONEY ORDERS, and CREDIT CARDS** clear immediately. When ordering with a credit card you must give us your telephone number and billing address. We will not ship to another person at another address without first confirming the cardholder's identity and billing address. This is for your protection. Call for more information.

UPS charges are on the order form. These are for the continental 48 states. Call for UPS charges to other areas. Items that are too large or heavy to ship UPS are shipped by common carrier. These items are normally refrigerators and freezers, batteries, large solar modules, top-of-pole and track racks, large inverters and space and hot eater heaters. Call for freight quote.

There is **NO MASSACHUSETTS SALES TAX** (for residents of Massachusetts) for PV equipment if the owner of the principal dwelling files a form ST-12A. The form is filled out by you for each purchase stating that this PV equipment is for use in your principal dwelling. You give us the form and we won't charge you the sales tax. We have these forms on file if you need one.

NEW ENGLAND SOLAR ELECTRIC INC.
401 Huntington Road
P.O. BOX 435
WORTHINGTON, MA 01098
413-238-5974

9 AM - 5 PM Mon. - Fri.
EASTERN STANDARD TIME

FREE CATALOG FOR A NEIGHBOR

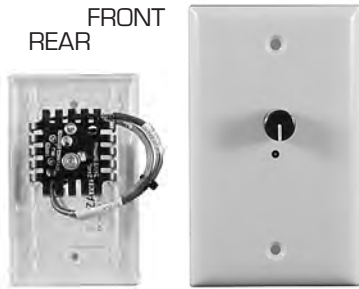
Do you have a friend or neighbor who has no power line at his home or cabin? We will mail him or her our \$3 catalog for free if you fill out the following information or call in the information to 413-238-5974. There is an answer machine to take your information after our working hours.

Remote Home Remote Cabin
 Own a Remote Building Lot
Distance to power line _____
Price to bring in power _____
Currently have? PV Generator
Batteries _____
Name _____
Address _____
City _____
State _____ Zip _____

DISCONTINUED SALE ITEMS

12V Motor Speed Control 8A

12V DC Motor only. 8 Amps Max.
Normally \$45 **now \$20** We have three.



Square-D Circuit Breakers and Boxes 50% Off

The circuit breakers listed below are rated for DC current (up to 48VDC) as well as AC current. They have a maximum of 2000 amps interrupt current. We are now using only DC circuit breakers rated at 10,000 amps interrupt current. You do not need a series fuse with the DC breakers we now use. One is required when using Square-D breakers.

- | | | |
|---------|----------------------------|-------------------|
| 343-1xx | 30, 40 and 60A Single Pole | \$7 limited qtys |
| 343-2xx | 20 and 30A Double Pole | \$15 limited qtys |
| 351-00 | 2 Position Load Center | \$20 have 2 |
- (breakers not included)



Breakers:
Double &
Single Pole

Brand Power Meters...less than 1/2 Price

Normally \$149.95 **now \$49** We have 3.
See page 39 for details



Thin-Lite Sale - Discontinued Inventory

All fixtures 50% off. Priced as shown below.

Thin-Lite Circline Fixtures

- | | | | |
|---------|-----------------------------------|--------|------|
| 810-108 | Thin-Lite 108 12v 22w 1100 lumens | have 4 | \$19 |
| 810-208 | Thin-Lite 208 24v 22w 1100 lumens | have 5 | \$25 |



Thin-Lite 190 Series

- | | | |
|---------|----------------------------------|------|
| 811-191 | Thin-Lite 191 12v 8w 400 lumens | \$15 |
| | 12.4" x 2.3" x 2.5" have 7 | |
| 811-193 | Thin-Lite 193 12v 15w 870 lumens | \$17 |
| | 18.2" x 2.3" x 2.5" have 6 | |



Thin-Lite 193

Thin-Lite 180 and 280 Series PL

- | | | |
|---------|-----------------------------------|------|
| 812-186 | Thin-Lite 186 12v 36w 2900 lumens | \$30 |
| | 18.0" x 3.6" x 3.5" have 3 | |
| 812-286 | Thin-Lite 286 24v 36w 2900 lumens | \$38 |
| | 18.0" x 3.6" x 3.5" have 2' | |



We also have:

- Five 24VDC 13W Downlights: were \$49, now \$24.50
- One 24VDC 13W Flood: was \$54, now \$27

Sale

Magnum Inverter Sale

Save 20% on all Magnum Inverters

See page 44 and 45 for Magnum inverter specifications and normal pricing.

OutBack Inverter Sale

Save 20% on All OutBack Inverters

See page 46 for OutBack inverter specifications and normal pricing.

Schneider SW Inverters

Save 20% on all Schneider/Xantrex Inverters

See pages 48 and 49 for Schneider inverter specifications and normal pricing.

Samlex 600W Sine Wave Inverter

SSW-600-12A 12V 600W The SSW series is not as robust as the PST series.

Was \$219, now \$159 have 2

Small Modified Sine-wave Inverters

These are samples we bought and then decided only to carry small sine-wave inverters:

400W Samlex...\$39 have 2

800W samlex...\$49 have 1

Backwoods Home Magazine “Best-of” Books Discounted 50%

See page 4 for book descriptions.

We will match or beat most any sale price on any PV module, Trace inverter, Servel refrigerator, Trojan battery or any other product we sell.

Our System Picture Offer is Still Good

We have been offering \$100 credit on anything from this catalog for the use of your picture on our catalog cover. There is no limitation on how you could use the credit—sale items, you name it.

We have been offering \$25 credit on any new picture used on the inside pages of the catalog.

Both of these offers are ongoing and still valid.

Just remember we can't return the pictures, so make sure you send us duplicates.

Thanks and I hope we use your picture.

Index

Array Wiring 36 - 37
Batteries 50 - 53
Books 4 - 5
Charge Controllers and Accessories 32 - 35
Charge Controller Kits 35
DC Distribution Equipment 54 - 56
DC Power Conversion 57
Fans, All Types 64
Freezers, Electric 68
Fuses, Fuse Holders 48, 55
Gas Lights 67
Gas Ranges 69
Generator/Inverter/Charger Kits 22 - 25
Heaters, Gas Space 65
Inverters 40 - 45
Inverter Pre-Wired Panels 46, 47
Inverter Disconnects and Cables 48, 49
Kits, Solar Electric System 6 - 21
Lighting 70 - 75
Meters 38 - 39
Modules, Solar Electric 26, 27
Module Mounting Racks 28 - 31
Multimeters 39
Order Form 77
Power Panels - Pre-Wired 46, 47
Plugs and Receptacles 56
Pumps, Water 58 - 62
Ranges, Gas 69
Refrigerators, Electric 68
Refrigerators, Gas 66 - 67
Sale Page: Used Equipment and Good Deals 78 - 79
Solar Electric Modules 26, 27
Solar Electric System Kits 6 - 21
Space Heaters, Gas 65
Toilet, Composting 63
Water Pumps 58 - 62
Wire 60

Presort Standard
U.S. Postage
PAID
Turley Publications Inc.

New England Solar Electric, Inc.
PO Box 435
Worthington, MA 01098

Please Recycle
This Recycled
Paper

Sale

Magnum Sine Wave Inverters

OutBack Inverters

Schneider/Xantrex Inverters

24V DC Lighting

See Inside Rear Cover for Details and More Sale Items

Order Toll Free: (800) 914-4131

Open: MON-FRI 9-5

Fax #: 413-238-0203 Phone #: 413-238-5974

E-mail: spschulze@newenglandsolar.com

www.newenglandsolar.com