Newmar A/C Electrical Systems 2010 & 2011

This class is designed to help the R.V. Technician identify and discuss electrical systems and components found in Newmar coaches.

120 V.A.C.

There are three sources of A.C. power available to the R.V.
  - Shore power – provided by R.V. Park or home service outlets.
  - Generator power
  - Inverter

Most R.V. Parks provide 30 amps. 120 vac service at the site. Many parks are providing 50 amps, 240 vac service to accommodate the electrical needs of newer and larger coaches. Shore power is supplied to the coach via power cord. Two sizes of power cord are found on Newmar products, 50 amp and 30 amp cords. The 50 amp cords are made up of four conductor’s #8 stranded wire and a molded plug. The 30 amp cords are made up of three conductor’s #10 stranded wire and a molded plug.
There are three sizes of power cord adaptors available. These adaptors are necessary when stepping down to use a smaller amperage outlet.

- 50 amp to 30 amp adaptor
- 50 amp to 20 amp adaptor
- 30 amp to 20 amp adaptor

**Trouble shooting tips when using adaptors**

1. Melted or damaged adaptors
   - Internal melting causing poor connection or no connection.

2. Insufficient amperage
   - Limited use of appliances
   - Tripping of breaker at the post

3. Low voltage
   - Caused by use of adaptor and long extension cords or too small wire size extension cords

It is important to educate the customer on the use of adaptors and their affects on the electrical system’s capabilities.
Automatic Transfer Switches

All late models Newmar coaches equipped with a generator will have an automatic transfer switch. The transfer switch is located in the electrical compartment and connected to the power cord. Some early models may have a recept that the shore power cord must plug into to connect the generator to the main service panel. Current models ~ when ordering generator prep will have a transfer switch installed.

The 50 amp transfer switch consists of a printed circuit control board, two electromagnetic contact blocks and terminal connecting lugs. The shore power cord is connected to one of the contact blocks and the generator is connected to the other. The generator is always wired into the priority circuit of the transfer switch. The supply leads to the main service panel are also connected to the transfer switch.

When electricity is supplied to the transfer switch “from shore power, generator or both” the control board opens or closes the contactors to select a power supply for the main service panel. The generator circuit is always a priority; a delay of approximately 40 seconds is built into the control board when the generator circuit is energized.

When work is performed or the transfer switch is replaced, always check for proper operation of the transfer switch on shore power and generator power.
5200 SERIES AUTOMATIC TRANSFER SWITCH

INTRODUCTION
The 5200 Series Automatic Transfer Switch is designed to automatically switch your RV's AC power from the Shore Power Cord to the Generator. When the RV Shore power cord is connected to the 50-amp outlet in an RV park, power is connected through the Transfer Switch directly to the RV AC Distribution Panel and then to all 120 VAC appliances and outlets. When the RV generator is started, a timing circuit in the 5200 Transfer Switch waits approximately 30-seconds to allow the generator to get up to speed. After this time delay, Shore Power is disconnected and generator power is now fed to the RV AC distribution Panel.

INSTALLATION
DUE TO THE HIGH VOLTAGES ASSOCIATED WITH ITS OPERATION ONLY QUALIFIED SERVICE PERSONNEL SHOULDN'T INSTALL THIS TRANSFER SWITCH! ALL APPLICABLE CODES AND STANDARDS MUST BE MET WHEN INSTALLING THIS DEVICE. SEE WIRING DIAGRAM INSIDE OF THE COVER AND ON BACK OF THIS PAGE.

The 5200 Automatic Transfer Switch can be mounted in any position provided there is room to route the Shore Power, Generator and Distribution Connection wires. The 5200 Transfer Switch is not suitable for outdoor locations and should be mounted inside the RV living quarters or the RV basement. We recommend that the Transfer Switch be mounted as close to the Shore Power and Generator power cords as practical to reduce voltage loss.

WARNING: THE 5200 TRANSFER SWITCH IS NOT IGNITION PROTECTED AND SHOULD NOT BE MOUNTED IN THE SAME COMPARTMENT AS THE BATTERIES OR FLAMMABLE MATERIALS SUCH AS GASOLINE. DO NOT MOUNT THE TRANSFER SWITCH IN THE GENERATOR OR LP GAS COMPARTMENT. A FIRE CAUSING PROPERTY DAMAGE SERIOUS INJURY OR DEATH COULD RESULT!

LIMITED WARRANTY
Progressive Dynamics, Inc. warrants each 5200 Series Automatic Transfer Switch to be free of defects in materials and workmanship under normal use for a period of 2-years after date of purchase. This warranty is only valid to the original owner within the continental limits of the U.S and Canada. Warranty claims within the first 24-months should be handled by the dealer that handles warranty claims for your RV.

SPECIFICATIONS (subject to change without notice)

- Electrical Rating: 120/240 VAC 60 Hz @ 50 amperes.
- [70 ohms resistance b/w Hot & Neutral on the Shore Power Connections]
- LO-Amp Drop-Out Protected: 90amps
- Maximum Generator rating: 12 KW
- Enclosure: UL Type 1
- Listed: Agency listed for the United States and Canada
- Weight: 6lbs ~Dimensions: 7 1/4"L X 6 3/4"W X 41/2"H

NOTE: Unit is not ignition protected

See our web site for additional information progressive dyn.com
5200 SERIES WIRING DIAGRAM

This Automatic Line/Generator Switch is rated for use on a circuit capable of delivering not more than 5000 RMS symmetrical amperes, 240 volts max.

WIRE RANGE: CU 6-18
TORQUE RATING:
20 IN. LBS AT CONTACTOR
USE COPPER WIRE ONLY

BONDING LUG
TORQUE RATING:
35 IN. LBS

LOAD

WIRE RANGE: CU 6-18
TORQUE RATING:
20 IN. LBS AT CONTACTOR
USE COPPER WIRE ONLY

GENERATOR

SHORE LINE

240VAC 50A. MAX.

QUICK REFERENCE

HI-POT PROCEDURE: Connect HOT 1 [or HOT 2] of Shore Line AND NEUTRAL together...then run HiPot from Hot & Neutral to GROUND.

TROUBLE SHOOT: If after initial hook-up, Contactor does not engage...A] Check if MAIN Power is on TIMER Circuit side. B] Remove LOAD Side of ATS, Energize. If Contactor engages, then re-install load side.

VISIT OUR WEB SITE TO SEE OTHER PRODUCTS WE MANUFACTURE.
Main Service Panel

The main service panel is typically located in either the bathroom or the bedroom. It is made up of terminal connections for incoming power leads, a main circuit breaker, several smaller circuit breakers and neutral and ground terminal bars. All 120 vac circuit breakers are located in the main service panel unless equipped with an inverter/converter. These units are also equipped with a sub panel. The sub panel is installed to limit AC power use when electricity is provided by an inverter. Two sizes of service panels are used in Newmar products, 50 amp double pole and 30 amp single pole. Any unit equipped with two air conditioners, or more, must have 50 amp service. Mountain Aire and down if equipped with an EMS System, the main breaker box & sub panel are all in one.

Care should be taken to balance the load placed on 50 amp services. Separating major draw items “12 amp or more” such as air conditioners, water heaters, inverter/converter, ect. Breakers positioned next to each other are on different poles. No more than three large items should be installed on a 30 amp service panel. When installing addition circuits in the service panel be sure to use correct breaker and wire size for the appliance being installed. For units equipped with energy management systems the EMS circuit board is located inside the main service panel.
**MAIN PNL**

<table>
<thead>
<tr>
<th>Circuit</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>FRONT AC MICROWAVE</td>
</tr>
<tr>
<td>15</td>
<td>MAIN 50</td>
</tr>
<tr>
<td>20</td>
<td>REAR AC WTR HTR</td>
</tr>
<tr>
<td>15</td>
<td>MAIN 50</td>
</tr>
<tr>
<td>20</td>
<td>DRYER LIGHT</td>
</tr>
<tr>
<td>15</td>
<td>WASHER KIT-1</td>
</tr>
<tr>
<td>20</td>
<td>CONVERTER BLANK</td>
</tr>
<tr>
<td>20</td>
<td>APPLIANCE BLANK</td>
</tr>
</tbody>
</table>

**L1**

- FRONT AC MICROWAVE
- REAR AC WTR HTR
- DRYER WASHER LIGHT
- KIT-1

**L2**

- FRONT AC MICROWAVE
- REAR AC WTR HTR
- DRYER WASHER LIGHT
- KIT-1

Optional circuits & (Leg +)

- L1:
  - Dishwasher (15A)
  - Washer (15A)
  - Vacuum (15A)
  - Dryer (20A)

- L2:
  - Dishwasher (15A)
  - Washer (15A)
  - Vacuum (15A)
  - Dryer (20A)

**NOTES:**

1. FOR SPECIFIC CIRCUIT ASSIGNMENTS REFERENCE THE APPLICABLE MODELS 120 VAC CHART.
2. FOR CIRCUIT BREAKER VALUES REFERENCE THE APPLICABLE MODELS 120 VAC CHART.
3. ALL 20A BRANCH CIRCUITS WIRED WITH 12-2 ROMEX TYPE NM-B.
   - ALL 15A BRANCH CIRCUITS WIRED WITH 14-2 ROMEX TYPE NM-B.
BEFORE YOU BLOW YOUR "BREAKER"

Take a few minutes and see how many AMPS you could be using in your RV's 30 or 50 AMP electrical system. It's surprising how fast the AMPS add up, which causes your breaker in your unit or the Campground to "Trip". Knowing the AMPS of all the electrical appliances in your RV can help you manage electrical use and prevent the inconvenience of "WHY DID I BLOW MY BREAKER". This list is the typical appliances used and the average amps required to operate them.

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Amps</th>
<th>Appliance</th>
<th>Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Conditioner 15,000 BTU</td>
<td>12.2</td>
<td>Battery charger</td>
<td>6.2</td>
</tr>
<tr>
<td>Computer &amp; Printer</td>
<td>.07</td>
<td>Converter</td>
<td>5.5</td>
</tr>
<tr>
<td>Curling Iron</td>
<td>.06</td>
<td>Electric Coffee Pot</td>
<td>9.0</td>
</tr>
<tr>
<td>Electric Hot Water Heater</td>
<td>12.5</td>
<td>Food Processor</td>
<td>6.0</td>
</tr>
<tr>
<td>Heating Pad</td>
<td>0.5</td>
<td>Ice Maker</td>
<td>4.0</td>
</tr>
<tr>
<td>Freezer</td>
<td>6.4</td>
<td>Hair Dryer</td>
<td>8.0</td>
</tr>
<tr>
<td>Iron</td>
<td>10.0</td>
<td>Inverter</td>
<td>16.0</td>
</tr>
<tr>
<td>Microwave Oven</td>
<td>12.5</td>
<td>TV</td>
<td>2.0</td>
</tr>
<tr>
<td>Radio</td>
<td>0.8</td>
<td>Toaster</td>
<td>8.0</td>
</tr>
<tr>
<td>Washer/Dryer (2 Piece)</td>
<td>16.0</td>
<td>Vacuum Cleaner</td>
<td>2.0</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>7.0</td>
<td>VCR</td>
<td>1.0</td>
</tr>
<tr>
<td>Electric Frying Pan</td>
<td>10.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As an example, take an average morning - if you start your air conditioner and your hot water heater is on, then you start your coffee pot, make some toast, turn on the TV - you're pulling 55 amps when all appliances are operating at the same time, you are at the maximum. Plus, if you also cook your bacon in the microwave at the same time when everything else is on! LOOK OUT! Most RV's have a switch so you can run only the microwave or the water heater at one time. - BUT SOME RV'S DO NOT HAVE THIS FEATURE. So now you have a problem!

Most electrical products show how many watts or amps it takes to operate the appliance printed on the product itself or in the instructions. If it shows the watts - divide the watts by 120 (volts) and that gives you the amps. To get the watts - multiply the amps by 120 (volts).

It's worth your time to take an inventory on the "AMPS" each of your electrical appliances uses. Then you can manage your total usage at one time and this greatly reduces the

"WHY DID I LOOSE MY POWER?"
50 AMP Power Control System E.M.S.

Note: Before too much time is spent on repairs, obtain the programming sheet for the EMS.

The 50 amp Power Control System is currently being offered as standard equipment on all Canyon Star Class A Motor Homes and as optional equipment on most other Newmar coaches. Its function is to provide circuit protection for all 120 VAC loads and as a system of energy management to minimize the overloading and tripping of circuit breakers. It is made up of a main distribution panel with a self-contained control module and a remote display panel. Remote display panel is typically located in the dash overhead electrical control cabinet. The E.M.S. control module automatically senses the available power being supplied to the coach. The module determines whether it is connected to a 50 amp 240 VAC shore power source or a generator, (has a 12 volt sense wire) and a 120 VAC, but does not know if the power source is 30, 20, or a 15 amp shore power source. Depending on available power it can control seven possible loads. It controls air conditioner loads using low voltage switching and other 120 VAC loads, typically heavy load IE appliances. The EMS will also control the 2012 Magnum inverter charge rate, or may go to invert depending on the charging status, will only reduce the charger when the charger is a float charge.

The 2 main hot wires go through the magnetically coupled current sensor. It will then display the amperage on each line. When the current exceeds the limit on either line, the EMS will start shedding loads, and looks at the current when it shuts a load off so it knows if it has enough current available to turn the load back on.

When the EMS sheds a load, it only looks at one line to see how much of a load was shed. So if the load that was shed is not on the correct line #1 or #2 according to the "Power Control System RV
Data" sheet. The EMS will not know how much was shut off and it will shut something else off. This is why you will not be able to work on a (power control system 50 amp) without the "RV Data" Sheet. The "RV Data" sheet will tell you which line and which relay that item has to be connected to. Also, when the unit has an Oasis System with 2 water heater elements, the #2 water heater element has to be wired to the unlabeled wires on the Oasis, so that it will only shut off 1 element at a time. If you shut off the primary element on the Oasis it will shut off both elements. Then when the EMS turns the water heater back on, both will come on and over load the system. Primary element on the Oasis, to water heater #1.

Note: When adding a Magnum Auto Generator Start...
1. The inverter remote panel has to be 2.5 or higher software.
2. Also, the EMS Power Control System 50 amp software has to be 4.0 or higher, (the main board in the breaker box and the EMS Remote Panel.)
System:
The Power Control System (PCS) consists of two major components:
1. PCS Central Monitor Panel &
2. PCS Panelboard for 50amp service.
The Panelboard may optionally have a subpanel built in.
a. The Panelboard also houses the PCS Control Module, and has two current sensors

Overview:
The Power Control System (PCS) Panelboard distributes all the 120VAC power throughout the RV, whether it comes from Shore Power, Generator, or the Inverter. The PCS Control monitors the incoming power, and manages the power to reduce Circuit Breaker tripping. It does this by momentarily shedding power to the loads under its control when the owner turns on other more critical appliances in the RV. PCS restores power when the owner controlled appliance is turned off. The PCS Central Monitor Panel displays the status of Incoming Power, and the Controlled Loads.

When coupled with a Magnum Inverter, PCS reduces Battery Charge Rate prior to shedding any loads. Working together, an Inverter Assist feature is available. Normally the Inverter is at rest when Shore Power is available. PCS utilizes the Inverter and the Coach Battery Bank to smooth out Peak Load Demands. In other words the Inverter will temporarily provide power to some of the appliances, prior to shedding any loads.

Features:
- Monitor and Manage total RV current to avoid nuisance circuit breaker tripping.
- Manage battery charging during high peak demands.
- Provide Inverter-Assist, additional power from battery bank to smooth high peak demands.
- Shed non-critical loads during high peak loads.
- Remote Panel displays Service Type, Load Status, and RV Current & Voltage.
- Generator Soft Start

DANGER: HAZARD OF ELECTRICAL SHOCK OR BURN. TURN OFF POWER SUPPLY BEFORE WORKING INSIDE.

120/240VAC present inside Panelboard posing potential lethal electrical shock. This equipment should only be serviced by a qualified Service Technician.
Central Monitor Panel:
The **PCS Monitor** displays pertinent **Power Control System** status information. The UP and DOWN buttons are used to step through each individual Screen of information. Pressing & releasing either the UP or DOWN button will step to either the Previous or Next Display Screen. Once all the Screens have been seen, the next press of the Button will wrap back around through all the Display Screens once again. The SET Button only functions when the Service Type screen is displayed, to Select between 30A Service and 20A Service. (Note: 50A Service or Generator Service overrides the SET Button.) If there have not been any key presses for awhile, the PCS Monitor turns off the backlighting to save on power. The first press of any key will only turn on the backlighting.

Service Type:
No Service - **PCS** has 12V Battery power to run the electronics, however, it does not sense any 120/240VAC Power.

50-amp Service - **PCS** senses 240/208VAC between L1 and L2 to determine this mode of operation. **PCS** controls the loads so that the current does not exceed L1 limit of 50amps, L2 limit of 50amps, and a combined limit of 100 amps.

30-amp Service - **PCS** senses 0VAC between L1 and L2. **PCS** adds the current of the two sensors and controls the loads so that the current does not exceed 30 amps.

20-amp Service - **PCS** senses 0VAC between L1 and L2, and the owner selects 20A on the Central Monitor Panel. **PCS** adds the current of the two sensors and controls the loads so that the current does not exceed 20 amps.

Generator - **PCS** senses power to the Gen Hour Meter to determine this mode of operation. **PCS** controls the loads so that the current does not exceed the ratings of the installed Generator, for example L1 limit of 35amps, L2 limit of 35amps, and a combined Limit of 63 amps.

Operation Mode:
This Screen gives the general information about Load Status.

The First Line shows the Status of the Magnum Battery Charger. It will either be: **Bat Charge Normal**, under complete Magnum Control, or **Bat Charge Reduced**, which means an Owner activated appliance would have caused a circuit breaker to trip but instead the **Bat Charge Rate** has been reduced. Reducing the Battery will be the 1st thing that PCS will attempt in order to reduce overall RV Power. Battery Charge may not be reduced if the Battery is Low, or the Magnum Inverter is on Line 1 Circuit Breaker and the Overload is on Line 2 only.

The Second Line show the Status of the Magnum Inverter. It will either show **Inverter Normal**, under complete Magnum Control. **Inverter Assist**, **PCS** is requesting that the Magnum Inverter assist by temporarily generating 120VAC power from the batteries. **Inverter Assist 12A**, the end of this line shows the amount of 120VAC current that the Inverter is supplying. **Inverter Assist Deny**, means the Magnum Inverter can not Assist at this time, for one of many Magnum Inverter reasons, i.e. Battery Low, Over-current, etc. (See Magnum Owner's Manual).

The Last Line shows if any Loads have been Shed to prevent circuit breaker tripping. Load<i>Cs</i> Shed = 7, depending on the model RV, there can be up to 7 Loads that PCS can control.
Load Status:
Where the last Screen gave general information about all the controlled Loads, these next two screens gives detailed information about the status of each Load under PCS control.

Water Heater OFF 11A, indicates that the Water Heater power has been temporarily turned OFF, and the current at the instant the Water Heater was turned off was 11amps.

Refrigerator ON 7A, indicates that the Refrigerator has power. Again the 7amps of current is NOT the present current draw, but rather the current at the instant the Refrigerator was turned off last.

A/C #2 ON, indicates that the A/C #2 has power. Since there is no current displayed, that only indicates that this load has not been turned OFF even once since the Battery has been reconnected and 12V power applied to PCS. PCS has never had a chance to "Learn" the current. The Current Displayed, is re-learned each and every time that the Load is turned OFF.

Looking at the list, it appears that PCS does not turn off Loads in Order Preference. PCS will always start shedding loads from the top of the load when PCS in 30A or 20A Service. However, in 50A Service, or running on the Generator there are two Main Breaker, Line 1 & Line 2. PCS will only shed loads if there is an overload detected on its associated Line. In other words, if shedding the Load will not help, skip it and move on. If then sometime in the future an overload is detected on the other Line, PCS will start at the top of the list again. The same is true with Magnum Battery Charge Reduction and Inverter Assist. Magnum can only help on the Line it is wired to, so if it will not help to Assist, don't bother.

Power Management:
When the current exceeds the limit, because possibly the owner has turned on the Microwave, the PCS will independently limit the current on each line by performing the following in order: Reduce Magnum Battery Charge Rate, Inverter Assist, Load Shed. (If the Magnum Inverter is wired to the opposite leg, only Load Shedding will occur.

As each appliance is shed, PCS learns the current for that specific appliance, to ensure that there will be sufficient headroom to turn the appliance back on and be under the current limit. To ensure that Air Conditioner compressor pressure is bled, and to reduce quick cycling, there is a 2 minute delay from the time a Load has been shed, to the time power is restored.

Once the total RV current has dropped, for example because an owner operated appliance has been turned off, the PCS will reverse the above procedure, returning power to appliances whose operation was not immediately critical.

Line Status:
PCS not only monitors total RV current but also has two built in Volt Meters, and monitors the voltage on each of the Lines.

L1 121Volts 15Amps, indicates that Line 1 has 121Volts and is presently drawing 15 amps.

! BrownOut!, if the display indicates Brown Out, the Display will hold the lowest captured voltage that may have occurred while the RV owner is away. Pressing any switch clears the display, and resumes displaying the present readings.

Wiring Status:
Similar to an Outlet Tester that is plugged into outlets in your home to test for proper wiring, PCS monitors the wiring status of the Camp Ground Outlets you may plug into.

WARNING, IF THE DISPLAY EVER INDICATES WiringStatus Error IMMEDIATELY, unplug the RV from the outlet, and have the outlet inspected by a qualified technician.

The other lines on the Display to the right indicate proper wiring for 50A Service. For 30A Service L1=L2.
Inverter Assist Feature:
The PCS works with the MAGNUM Energy Inverter/Charger to bring the RV industry a revolutionary new concept. In the past, energy management systems operated when 120VAC was available and inverters operated when 120VAC was not available from either shore power or generator. The Power Control System brings these two worlds together. First, the PCS will communicate with the Magnum Inverter/Charger and reduce Battery Charge Rate during periods of RV high current demands. While plugged into shore power, or when the generator is running, the PCS will allow the RV to have more power than available on the shore power or generator, for short periods of time. When the PCS senses that 120VAC power has reached its maximum current, the PCS communicates to the MAGNUM inverter requesting additional power be generated from the battery. If more demands are put on the RV with additional appliances, or with the RV batteries are low, the PCS will shed non-critical loads and avoid nuisance tripping of circuit breakers.

Generator Soft Start:
When the Generator is first turned on, the PCS will shed all the controlled loads. The loads are sequenced back on. This is done to allow the generator to come up with minimum load, and to reduce the current the Transfer Switch must handle. Note: PCS applies the same 2 minute delay to turning loads on is when Power Management Load Shedding occurs.

RV Data Parameters:
The RV manufacturer has full flexibility to set up the RV Data Parameters through a Windows Program and Program Dongle. The following parameters are downloaded into each PCS system.
Load Names, Load Shed Order, Load-Relay Association, Generator Size, Inverter Information.
These parameters can not be set or changed by the dealer or owner. Each RV Data Set has a unique 18-character Reference ID, where the first digits are the manufacturer's code, the last digits are the revision date, and the remaining middle characters have some model designation.

RV Data Synchronization:
The RV Data Parameters are stored in both the PCS Central Monitor Panel and the PCS Controller. Should dealer or field replacement of either unit become necessary, a blank unit can be installed and the RV Data will be synchronized or transferred from remaining unit. During Power-Up the Monitor and Controller check their RV Data and one of four screens can appear.

1. Everything is Synchronized and the Monitor Version, Controller Version, and Ref ID are displayed.
2. RV Data is transferred from Controller to Monitor
3. RV Data is being transferred from Monitor to Controller
4. RV DATA in Monitor and Controller is different and the PCS System can not continue. This can happen for example if a Monitor from one RV is installed in a different model RV.

If for any reason the Controller stops to function, no problem with the Limp Home Feature, all Controlled Loads will continue to operate. Care will have to be used not to turn on too many appliances, overload the system, and trip breakers.
Indoor Panelboard Installation Instructions
CAT. NO. 00-10020-000 PANELBOARD & SUB PANEL
CAT. NO. 00-10020-100 PANELBOARD

Remove Branch KO's
Remove Branch Knock-Out's; place screwdriver as shown and tap end to remove KO. If KO is not completely removed, twist out with pliers.

Main wires
Mains must be installed through this opening using a 1" connector. If a 1-1/4" connector is required, remove Knock-Out ring; place screwdriver as shown and tap end to remove KO ring. If KO is not completely removed, twist out with pliers.

Mount Box
Flush mount box into a 15-5/8" X 8-5/8" opening. Remember to leave 17-1/2" X 10-1/2" minimum clearance for the cover. Using six (6) #8 screws (not provided) attach box to wall using the mounting holes shown. Note: Box may be mounted as shown or rotated 90° clockwise.

Wire Main, Branch & optional Sub-Panel Circuits
The following breakers are suitable for MAIN and Branch breakers:
- Cutler-Hammer: BR, BD, GFCB, Filler Plate BRFP
- Siemens: QP, QT, Filler Plate QF3
- GE: THQL
- Square D: HOM, HOMT
Make certain circuit breakers are in the OFF position prior to installation.

IMPORTANT:
Tighten all electrical connections before energizing. Follow Torque Specifications on the Inside Cover Label.

DANGER:
120/240VAC present inside Panelboard posing potential lethal electrical shock. This equipment should only be serviced by a qualified Service Technician.
Remove Cover Twist-Outs
Twist and remove to create openings for positions where breaker has been installed.

Install Cover
1) Slide Cover slots over Box tabs.
2) Rotate Cover down to Box
3) Screw Cover to Box using two (2) 8-32 X7/16" screws provided.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to Precision Circuits Inc.

Route Communication Cables
1) If only installing the Power Control System, use above wiring diagram.

2) If utilizing the optional Inverter Assist feature, use the below wiring diagram.

WIRING IF INSTALLING EITHER UNIT ALONE

WIRING IF INSTALLING BOTH UNITS
Connect or wiring and pinout does not change only cables lengths and plug-in locations.
PCS Control Installation Instructions

1) Prepare Main Supply Cable by removing outer Jacket and cutting and stripping wires to lengths shown.

2) In the same manner used for the Branch Circuit Knock-outs, remove the rectangular KO to provide access to the 12VDC, and communication connections.

3) Install Circuit Breakers into Panel Board.

4) Using 1" Connector, (1-1/4" if KO ring is removed) install Main Supply Cable into AC Panel Board knock-out shown, and secure main cable to housing.

5) Bend Ground Wire towards back of box, run along the back, and connect to Ground Block.

6) Bend White Neutral Wire towards back of box, run along the back and connect to Neutral Block.

   Note: Bend Ground and Neutral wires to clear the Current Sensor Cup for the next step.

   Note: it is critical to maintain L1 & L2 relationship throughout the entire installation. For example, the Black wire must go through the L1 Current Sensor hole, connect to the L1 Main circuit breaker, and the PCS Control L1 screw terminals must be connected to the L1 Branch breakers.

7) Slide the Black-Line1 and Red-Line2 wires through Current Sensor Cup holes.

8) Continue to slide the Sensor Cup/Barrier Wall assembly into the housing guides, until the Wall touches the back of the box.

9) Secure Current Sensor/Barrier Wall Assembly to Housing using 8-32 X 7/16" screw provided.

11) Both Black and Red wires should be below the level of plastic post for easier cover attachment.

12) Wire PCS Control Screw Terminal Block per the diagram.

**Screw Terminal Block Torque: 9-in-lbs**

Note: The three Voltage Sense terminals must always be wired for proper voltage sensing and operation, even if corresponding relays are not used.

Tip: Things like Water Heater, whose circuit breaker is occasionally turned off, should not be wired to Relay 3 or Relay 5.

13) Make 12VDC connections through the rectangular knock-out located in the back of the box per the diagram on the right and pin-out below.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>GROUND</td>
</tr>
<tr>
<td>02</td>
<td>COACH BAT</td>
</tr>
<tr>
<td>03</td>
<td>AIR COND 1 NO</td>
</tr>
<tr>
<td>04</td>
<td>AIR COND 1 COM</td>
</tr>
<tr>
<td>05</td>
<td>AIR COND 1 NC</td>
</tr>
<tr>
<td>06</td>
<td>AIR COND 3 NO</td>
</tr>
<tr>
<td>07</td>
<td>GEN SET RUN</td>
</tr>
<tr>
<td>08</td>
<td>AIR COND 2 NC</td>
</tr>
<tr>
<td>09</td>
<td>AIR COND 2 COM</td>
</tr>
<tr>
<td>10</td>
<td>AIR COND 2 NO</td>
</tr>
<tr>
<td>11</td>
<td>AIR COND 3 NC</td>
</tr>
<tr>
<td>12</td>
<td>AIR COND 3 COM</td>
</tr>
</tbody>
</table>

Mating Connector: MOLEX MINI-FIT JR 12-PIN, #39-01-2120
Contact: MOLEX MINI-FIT JR 5556 18-24 AWG, 39-00-0039

Four different Air Condition Compressor wiring options are shown on the right. Relay Contacts are drawn in Non-Shed or Operation Mode.
120V Energy Management features usually found in high end Class A Motor homes are now made affordable for all RVs including Class C and Trailer Market. The Mini-PCS monitors the total AC current of an RV and prevents circuit breaker tripping by momentarily shedding up to four loads. As the owner turns on additional appliances such as a Microwave, Coffee Pot, or Hair Dryer, the Mini-PCS can shed two 120VAC appliances such as the Refrigerator and Water Heater, then if additional reduction in power is required the second air conditioner, and lastly the first air conditioner is shed. As the owner selected appliances are turned off, the Mini-PCS will automatically turn power back on to each of the shed loads in reverse sequence. The Mini-PCS will constantly monitor 120VAC RV power and shed and restore power to the four controlled loads.

The I/O Module is installed inside any circuit breaker panel and fits into a standard 3/4" knock-out hole. The screw terminals are used to make the 120VAC connections. Outside the circuit breaker panel a data cable is connected through the 3/4" knock-out which goes to the Display Panel. The Display Panel has a Data connector and also another connector to control the air conditioner units through low voltage signals.

**Key Features:**
1. Helps owners who are use to 50amp service, deal with the common situation of camp grounds where only 30amp service is available.
2. Limits total current to 30 amps, when 50amp service is not available.
4. Monitors current draw for entire RV including owner added loads.
5. Learns controlled appliance current draw.
6. Allows 2 air conditioners to run on 30 amp service when other appliances are not in use.
7. I/O Module fits into a standard 3/4" knock-out
   - Two Relays capable of 120VAC 18 Amp load.
8. 120VAC Sense
   - I/O Module has built in 120VAC sense circuitry so that it knows when shore power is available and does not draw on the battery when dry camping. No AC wall adaptor or other sensors required.
9. Display Panel has built in relays to control two air conditioners, no other modules required.
10. All relays are normally closed allowing full operation of appliance in case of fault.
Operation:
30-amp Service - **MINI-PCS** senses 0VAC between L1 and L2. The I/O Module has a current sensor which monitors the current on the neutral wire. When the current exceeds the 30-amp limit, because possibly the owner has turned on the Microwave, the **MINI-PCS** will limit the current by sheding appliances. Once the total RV current has dropped, for example because an owner operated appliance has been turned off, the **MINI-PCS** will reverse the above procedure, returning power to appliances whose operation was not immediately critical. Appliance shed order is easily determined by the manufacturer by wiring the appliances to the appropriate number relay.

20-amp Service - **MINI-PCS** senses 0VAC between L1 and L2, and the owner selects 20A on the Remote Display. **MINI-PCS** performs the same functions as above except that it limits total current to 20amps.

Generator - **MINI-PCS** senses power to the Generator Hour Meter. In this mode **MINI-PCS** assumes enough power is available and goes to sleep. It displays the fact that Gen-Set is running, that all Loads are powered.

50-amp Service - **MINI-PCS** senses 240VAC between L1 and L2 to determine this mode of operation. In this mode **MINI-PCS** assumes enough power is available and goes to sleep. It displays the fact that 50-amp Service is available and that all loads are powered.

I/O Module - Features include:
- Current Sensor
- Two 18amp Relays
- Power Line sensing
- Two Screw Terminal configurations available

Remote Display - Features include:
- Displays Service Type
- Displays the Status of the Controlled Appliances
- Custom Load Names available

**Specifications:**

<table>
<thead>
<tr>
<th>Part Numbers:</th>
<th>Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>00-10024-000</td>
<td>Mini-PCS I/O Module, w/Vertical Terminals</td>
</tr>
<tr>
<td>00-10024-100</td>
<td>Mini-PCS I/O Module, w/Right Angle Screw Terminals</td>
</tr>
<tr>
<td>00-10025-000</td>
<td>Mini-PCS Display Panel, 3 Loads, W/H, A/C-2, A/C-1</td>
</tr>
<tr>
<td>00-10025-100</td>
<td>Mini-PCS Display Panel, 4 Loads, Rf/H, A/C-2, A/C-1</td>
</tr>
<tr>
<td>00-10025-500</td>
<td>Mini-PCS Display Panel, Amp Meter, 4 Loads, Rf/H, A/C-2, A/C-1</td>
</tr>
</tbody>
</table>

Service type: 120/240VAC max

Relays:
- (2) DC 16VDC, 1.0A (Display Panel, Thermostat)
- (2) AC 120VAC, 18A, 1HP (I/O Module)

Delay: 2 minute minimum off time on all loads

Environment: Indoor, Out of direct weather

Dimensions: 6.25" wide, 3.20" high, 1.0" deep

Mounting Hole: 5.45" wide, 2.91" high (centered with 15" clearance), 188" mount holes

<table>
<thead>
<tr>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volts DC</td>
<td>9.0VDC</td>
<td>12.0VDC</td>
</tr>
<tr>
<td>Volts AC</td>
<td>90VAC/line</td>
<td>240VAC</td>
</tr>
<tr>
<td>Ambient Temperature</td>
<td>-40°C</td>
<td></td>
</tr>
</tbody>
</table>

Display Panel: Low Voltage Connector:
01 AIR COND 1 NC
02 AIR COND 1 COM
03 NO CONNECT
04 AIR COND 2 COM
05 AIR COND 2 NC
06 AIR COND 1 NC
07 GEN SET RUN
08 COACH BAT
09 GROUND
10 AIR COND 2 NC

Mating Connector: MOLEX MINI-FIT JR 10-PIN, #39-01-2100
Contact: MOLEX MINI-FIT JR 5556 18-24 AWG, 39-06-039

View of connector is from contact insertion side

Four different Air Condition Compressor wiring options are shown above. Relay Contacts are drawn in Non-Shed or Operation Mode.

Option 1, A/C sheds with Ground Signal
Connect to Ground

Option 2, A/C sheds with +12V Signal
Connect to +12V

Option 3, A/C operates with Ground Signal
Connect to Ground

Option 4, A/C operates with +12V Signal
Connect to +12V

Note: The three Voltage Sense terminals must always be wired for proper Service Type detection, even if corresponding relays are not used.
The Relay Module can be used to safely control (on/off) any 120V appliance using 12V signals. The Relay Module is just a simple SPDT relay that has been repackaged, having both Normally Closed (NC) and Normally Open (NO) contacts available through screw terminals. With the Common (COM) and NC contact, connected to a TV, Block Heater or Awning, it can be used as an Ignition Lock-out feature. Using the NO and COM contacts, the Relay module can control a Water Heater.

Key Features:
1. UL Listed.
2. Safe Isolation of 120V and 12V wiring.
3. Can be used in any listed electrical enclosure with a ½" knock-out.
Specifications:

<table>
<thead>
<tr>
<th>Part Numbers</th>
<th>Amps</th>
<th>Terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>00-10026-000</td>
<td>15</td>
<td>3/4hp w/Vertical Terminals</td>
</tr>
<tr>
<td>00-10026-100</td>
<td>15</td>
<td>3/4hp w/Right Angle Screw Terminals</td>
</tr>
<tr>
<td>00-10026-200</td>
<td>15</td>
<td>1/2hp w/Vertical Terminals</td>
</tr>
<tr>
<td>00-10026-300</td>
<td>15</td>
<td>1/4hp w/Right Angle Screw Terminals</td>
</tr>
<tr>
<td>11-10026-000</td>
<td>15</td>
<td>Available Pigtails for Low Voltage connector</td>
</tr>
</tbody>
</table>

Environment: Indoor, Out of direct weather

Must be mounted inside listed electrical enclosure

Dimensions: 1-1/8" x 1-1/8" x 2-1/4" inside enclosure

Mounting Hole: 1/4" standard electrical knockout

Low Volt connector: Amp Mini-Universal Mate-N-Lok #172165-1 (Mating connector)

<table>
<thead>
<tr>
<th>Relay Coil Volts DC</th>
<th>Min-Hold</th>
<th>Min-Operate</th>
<th>Typical</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0VDC</td>
<td>9.0VDC</td>
<td>12.0VDC</td>
<td>16.0VDC</td>
<td></td>
</tr>
</tbody>
</table>

Contact Volts AC Rating: 120VAC

NO & NC Contact Rating Model -000, -100: 15amps 3/4hp

NO & NC Contact Rating Model -200, -300: 15amps 1/2hp

Screw Terminals Torque: 9-in-lbs

Screw Terminal Wire Range: 22awg, 12awg

Ambient Temperature (UL Rated): -40°C to +60°C

Installation:
1. Install inside any listed electrical enclosure, ensuring that the Screw Terminal side of the Relay Module is inside the enclosure when complete. Also there must be 1/4" clearance from any part of the module to any adjacent metal walls or exposed electrical conductors. (Clearance to the mounting wall is built into the Relay Module itself).

2. Remove 1/4" knock-out in enclosure.

3. Remove the supplied lock-nut, install Relay Module through the knock-out hole; from inside enclosure, and reinstall and tighten the lock-nut.

4. Wire the appliance to be controlled to the Screw Terminal Block, tightening to the proper torque specification.

5. Connect the low voltage wires to the relay coil through the 2 pin connector outside the enclosure.

6. Check wiring and cover the enclosure prior to applying power.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to Precision Circuits Inc.

IMPORTANT:
Tighten all electrical connections before energizing. Follow Torque Specifications above

DANGER:
120/240VAC surrounding Relay Module posing potential lethal electrical shock. This equipment should only be serviced by a qualified Service Technician.

700 South Road Lisle, IL 60532  www.PrecisionCircuitsInc.com  630-240-9832
## RV Specific Parameters

<table>
<thead>
<tr>
<th>Relay #</th>
<th>Relay Type</th>
<th>Relay Voltage</th>
<th>Relay Connector</th>
<th>Line Assoc</th>
<th>Load Name</th>
<th>Shed Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay 1</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-1-2</td>
<td>Water Heat</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Relay 2</td>
<td>Air Cond 1</td>
<td>12VDC</td>
<td>J4-3,4,5</td>
<td>AC Rear</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Relay 3</td>
<td>Air Cond 2</td>
<td>12VDC</td>
<td>J5-8,4</td>
<td>AC None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relay 4</td>
<td>Air Cond 2</td>
<td>12VDC</td>
<td>J4-8,9,10</td>
<td>AC Front</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Relay 5</td>
<td>120VAC 3</td>
<td>120VAC</td>
<td>J5-6,7</td>
<td>Block Heater</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Relay 6</td>
<td>Air Cond 3</td>
<td>12VDC</td>
<td>J4-6,11,12</td>
<td>AC Middle</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Relay 7</td>
<td>120VAC 4</td>
<td>120VAC</td>
<td>J5-8,9</td>
<td>Water Heat</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

### Note:
1. If Load Name does not exist, assume Relay has no load attached, and ignore Shed Order if any.
3. If there is a gap in Shed Order, everything will be shifted to lowest possible number.
4. Two relays can not have the same Shed Order #.
5. Shed Order number needs to be between the numbers of 1-7.
   a. Any Relay can be shed in any order.
   b. #1 will be first Load to Shed and last Load to return.
   c. Shed Order will be per list above if over-current exists for system.
   d. Shed Order may be modified if over-current condition exists on just one of the L1 or L2 Lines,
      i. Next shed-able Load is not shed because the current on it's Line is OK
      ii. Load is skipped and next shed-able Load associated with the proper Line over-current
          condition is chosen.
6. 120VAC Load association to L1 and L2 is fixed and can not be programmed.
**Power Control System**

**RV DATA**

**REFERENCE INFORMATION**

<table>
<thead>
<tr>
<th>REFERENCE ID</th>
<th>101</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANUFACTURER</td>
<td>NEWMAR</td>
</tr>
<tr>
<td>MODEL</td>
<td>2-A/C 8KW Gen</td>
</tr>
<tr>
<td>DATE</td>
<td>2-1-10 (101 = 10th year 1st revision)</td>
</tr>
</tbody>
</table>

**REFERENCE ID** is 18 character alpha numeric

Recommended usage:
1-3 Manufacturer
4-12 Model Name and/or #
13-18 Date

(REFERENCE ID will be critical to Identify Motor Home Data in Field in case of Repair/Replacement)

**LOAD SHED TABLE**

<table>
<thead>
<tr>
<th>Relay #</th>
<th>Relay Type</th>
<th>Relay Voltage</th>
<th>Relay Connector</th>
<th>Line</th>
<th>Load Name</th>
<th>Shed Order</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-1,2</td>
<td>1</td>
<td>Water</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Air Cond</td>
<td>12VDC</td>
<td>J4-3,4,5</td>
<td>2</td>
<td>A/C Heat</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>120VAC</td>
<td>12VDC</td>
<td>J5-3,4</td>
<td>1</td>
<td>None</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Air Cond</td>
<td>12VDC</td>
<td>J4-8,9,10</td>
<td>1</td>
<td>A/C Front</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-6,7</td>
<td>2</td>
<td>Block</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Air Cond</td>
<td>12VDC</td>
<td>J4-6,11,12</td>
<td>1</td>
<td>Water</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-8,9</td>
<td>2</td>
<td>Heat</td>
<td>3</td>
</tr>
</tbody>
</table>

**LOAD NAME** (12 Characters Max)

**Note:**
1. If Load Name does not exist, assume Relay has no load attached, and ignore Shed Order if any.
3. If there is a gap in Shed Order, everything will be shifted to lowest possible number.
4. Two relays can not have the same Shed Order #.
5. Shed Order number needs to be between the numbers of 1-7.
   a. Any Relay can be shed in any order.
   b. #1 will be first Load to Shed and last Load to return.
   c. Shed Order will be per list above if over-current exists for system.
   d. Shed Order may be modified if an over-current condition exists on just one of the L1 or L2 Lines.
      i. Next shed-able Load is not shed because the current on it’s Line is OK
      ii. Load is skipped and next shed-able Load associated with the proper Line over-current condition is chosen.
6. 120VAC Load association to L1 and L2 is fixed and can not be programmed.

**GENERATOR TABLE**

<table>
<thead>
<tr>
<th>Generator Parameters</th>
<th>Current (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Onan 8K</td>
</tr>
<tr>
<td>Line 1 Circuit Breaker</td>
<td>35</td>
</tr>
<tr>
<td>Line 2 Circuit Breaker</td>
<td>35</td>
</tr>
<tr>
<td>Combined Max Output Current</td>
<td>66</td>
</tr>
</tbody>
</table>

**INVERTER TABLE**

<table>
<thead>
<tr>
<th>Inverter Parameters</th>
<th>Model</th>
<th>Charger Branch Line (L1 or L2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>ME2012</td>
<td>L2</td>
</tr>
</tbody>
</table>

**INVERTER**

**Model**

**ME2012**

**Charger Branch Line (L1 or L2)**

**L2**
## Power Control System

### RV Data

**REFERENCE TABLE**

<table>
<thead>
<tr>
<th>REFERENCE ID</th>
<th>NMRO9CANYNST033108</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANUFACTURER</td>
<td>NEWMAR</td>
</tr>
<tr>
<td>MODEL</td>
<td>2009 CANYON STAR</td>
</tr>
<tr>
<td>DATE</td>
<td>03-31-08</td>
</tr>
</tbody>
</table>

(REFERENCE ID will be critical to identify Motor Home Data in Field in case of Repair/Replacement)

**RV REFERENCE INFORMATION**

REFERENCE ID is 18 character alpha numeric
Recommended usage:
1-3  Manufacturer
4-12 Model Name and/or #
13-18 Date

**LOAD SHED TABLE**

<table>
<thead>
<tr>
<th>Relay#</th>
<th>Relay Type</th>
<th>Relay Voltage</th>
<th>Relay Connector</th>
<th>Line Assoc.</th>
<th>Load Name (12 Characters Max)</th>
<th>Shed Order (1-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay 1</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-1,2</td>
<td>1</td>
<td>Bedroom Air</td>
<td>3</td>
</tr>
<tr>
<td>Relay 2</td>
<td>Air Cond 1</td>
<td>12VDC</td>
<td>J4-3,4,5</td>
<td>2</td>
<td>Bedroom Air</td>
<td>3</td>
</tr>
<tr>
<td>Relay 3</td>
<td>Air Cond 2</td>
<td>12VDC</td>
<td>J5-3,4</td>
<td>1</td>
<td>Living Room Air</td>
<td>4</td>
</tr>
<tr>
<td>Relay 4</td>
<td>Air Cond 3</td>
<td>12VDC</td>
<td>J4-8,9,10</td>
<td>1</td>
<td>Garage Air</td>
<td>2</td>
</tr>
<tr>
<td>Relay 5</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-6,7</td>
<td>2</td>
<td>Water Heater</td>
<td>1</td>
</tr>
</tbody>
</table>

**Note:**
1. If Relay 3, or Relay 5 is not used, power still needs to be connected
2. If Load Name does not exist, assume Relay has no load attached, and ignore Shed Order if any.
4. If there is a gap in Shed Order, everything will be shifted to lowest possible number.
5. Two relays cannot have the same Shed Order #.
6. Shed Order number needs to be between the numbers of 1-7.
   a. Any Relay can be shed in any order.
   b. #1 will be first Load to Shed and last Load to return.
   c. Shed Order will be per list above if over-current exists for system.
   d. Shed Order may be modified if an over-current condition exists on just one of the L1 or L2 Lines.
      i. Next shed-able Load is not shed because the current on it's Line is OK
      ii. Load is skipped and next shed-able Load associated with the proper Line over-current condition is chosen.

7. 120VAC Load association to L1 and L2 is fixed and can not be programmed.

**GENERATOR TABLE**

<table>
<thead>
<tr>
<th>Generator Parameters</th>
<th>Current (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Onan 3.5kw (1038)</td>
</tr>
<tr>
<td>Line 1 Circuit Breaker</td>
<td>30</td>
</tr>
<tr>
<td>Line 2 Circuit Breaker</td>
<td>30</td>
</tr>
<tr>
<td>Combined Max Output Current</td>
<td>45</td>
</tr>
</tbody>
</table>

**INVERTER TABLE**

<table>
<thead>
<tr>
<th>Inverter Parameters</th>
<th>Model</th>
<th>Charger Branch Line (L1 or L2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

**Inverter Parameters**
# Power Control System

## RV Data

### RV Reference Information

<table>
<thead>
<tr>
<th>REFERENCE ID</th>
<th>NMR3ACSCA</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANUFACTURER</td>
<td>NEWMAR</td>
</tr>
<tr>
<td>MODEL</td>
<td>CSCA</td>
</tr>
<tr>
<td>DATE</td>
<td>09-13-09</td>
</tr>
</tbody>
</table>

(REFERENCE ID will be critical to Identify Motor Home Data in Field in case of Repair/Replacement)

### RV Specific Parameters

<table>
<thead>
<tr>
<th>Relay</th>
<th>Relay Type</th>
<th>Relay Voltage</th>
<th>Relay Connector</th>
<th>Line Assoc</th>
<th>Load Name</th>
<th>Sheed Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay 2</td>
<td>Air Cond 1</td>
<td>12VDC</td>
<td>J4-3,4,5</td>
<td>2</td>
<td>Bedroom</td>
<td>3</td>
</tr>
<tr>
<td>Relay 3</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J4-3,4,5</td>
<td>5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Relay 4</td>
<td>Air Cond 2</td>
<td>12VDC</td>
<td>J4-8,9,10</td>
<td>1</td>
<td>Front</td>
<td>4</td>
</tr>
<tr>
<td>Relay 5</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J4-8,9,10</td>
<td>7</td>
<td>Garage</td>
<td>2</td>
</tr>
<tr>
<td>Relay 6</td>
<td>Air Cond 3</td>
<td>12VDC</td>
<td>J4-6,11,12</td>
<td>1</td>
<td>Garage</td>
<td>2</td>
</tr>
<tr>
<td>Relay 7</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J4-6,11,12</td>
<td>7</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

1. If Relay 3, or Relay 5 is not used, power still needs to be connected.
2. If Load Name does not exist, assume Relay has no load attached, and ignore Shed Order if any.
4. If there is a gap in Shed Order, everything will be shifted to lowest possible number.
5. Two relays can not have the same Shed Order #.
6. Shed Order number needs to be between the numbers of 1-7.
   a. Any Relay can be shed in any order.
   b. #1 will be first Load to Shed and last Load to return.
   c. Shed Order will be per list above if over-current exists for system.
   d. Shed Order may be modified if an over-current condition exists on just one of the L1 or L2 Lines.
      i. Next shed-able Load is not shed because the current on it's Line is OK
      ii. Load is skipped and next shed-able Load associated with the proper Line over-current condition is chosen.

7. 120VAC Load association to L1 and L2 is fixed and can not be programmed.

### Generator Parameters

<table>
<thead>
<tr>
<th>Model</th>
<th>Current (Amps)</th>
<th>Onan 7kw</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1 Circuit Breaker</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Line 2 Circuit Breaker</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Combined Max Output Current</td>
<td>58</td>
<td></td>
</tr>
</tbody>
</table>

### Inverter Parameters

<table>
<thead>
<tr>
<th>Model</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charger Branch Line (L1 or L2)</td>
<td>L2</td>
</tr>
</tbody>
</table>
Wrong set-up for generator, Dutch Star only gets an 8K gen, but the EMS is set-up for a 10K gen. So the EMS will never shed on the generator. Generator will just shut down.

## Power Control System
### RV Data

<table>
<thead>
<tr>
<th>REFERENCE ID</th>
<th>NM09DS3ACWO101807</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturer</td>
<td>NEWMAR</td>
</tr>
<tr>
<td>Model</td>
<td>2009 DUTCH STAR 3-A/C W OASIS</td>
</tr>
<tr>
<td>Date</td>
<td>10-18-07</td>
</tr>
</tbody>
</table>

(REFERENCE ID will be critical to identify Motor Home Data in Field in case of Repair/Replacement)

### Load Shed Table

<table>
<thead>
<tr>
<th>Relay #</th>
<th>Relay Type</th>
<th>Relay Voltage</th>
<th>Relay Connector</th>
<th>Line Assoc</th>
<th>Load Name (13 Characters Max)</th>
<th>Shed Order (1-7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay 1</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-1.2</td>
<td>1</td>
<td>Water Heater</td>
<td>2</td>
</tr>
<tr>
<td>Relay 2</td>
<td>Air Cond 1</td>
<td>12VDC</td>
<td>J4-3,4,5</td>
<td>1</td>
<td>A/C #2</td>
<td>6</td>
</tr>
<tr>
<td>Relay 3</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-3,4</td>
<td>1</td>
<td>Refrigerator</td>
<td>4</td>
</tr>
<tr>
<td>Relay 4</td>
<td>Air Cond 2</td>
<td>12VDC</td>
<td>J4-8,9,10</td>
<td>2</td>
<td>A/C #1</td>
<td>7</td>
</tr>
<tr>
<td>Relay 5</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-6,7</td>
<td>2</td>
<td>Block Heater</td>
<td>1</td>
</tr>
<tr>
<td>Relay 6</td>
<td>Air Cond 3</td>
<td>12VDC</td>
<td>J4-6,11,12</td>
<td>2</td>
<td>A/C #3</td>
<td>5</td>
</tr>
<tr>
<td>Relay 7</td>
<td>120VAC</td>
<td>120VAC</td>
<td>J5-8,9</td>
<td>2</td>
<td>Water Heater</td>
<td>1</td>
</tr>
</tbody>
</table>

Note:
1. If Load Name does not exist, assume Relay has no load attached, and ignore Shed Order if any.
3. If there is a gap in Shed Order, everything will be shifted to lowest possible number.
4. Two relays can not have the same Shed Order #.
5. Shed Order number needs to be between the numbers of 1-7.
   a. Any Relay can be shed in any order.
   b. #1 will be first Load to Shed and last Load to return.
   c. Shed Order will be per list above if over-current exists for system.
   d. Shed Order may be modified if an over-current condition exists on just one of the L1 or L2 Lines.
      i. Next shed-able Load is not shed because the current on it's Line is OK
      ii. Load is skipped and next shed-able Load associated with the proper Line over-current condition is chosen.
6. 120VAC Load association to L1 and L2 is fixed and can not be programmed.

### Generator Table

<table>
<thead>
<tr>
<th>Generator Parameters</th>
<th>Current (Amps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>Onan 10K</td>
</tr>
<tr>
<td>Line 1 Circuit Breaker</td>
<td>45</td>
</tr>
<tr>
<td>Line 2 Circuit Breaker</td>
<td>45</td>
</tr>
<tr>
<td>Combined Max Output Current</td>
<td>83</td>
</tr>
</tbody>
</table>

Only has an 8K generator, 66 amp max output.

### Inverter Table

<table>
<thead>
<tr>
<th>Inverter Parameters</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>ME2012</td>
</tr>
<tr>
<td>Charger Branch Line (L1 or L2)</td>
<td>L2</td>
</tr>
</tbody>
</table>
Converters

All Newmar R.V.’s are equipped with a converter or an Inverter/Converter combination. Converters are used to convert 120 VAC into 12 VDC. Converters supply the coach with 12 VDC power to operate 12 VDC appliances, equipment and to charge the coaches’ batteries. Newmar uses three sizes of converters, 45, 55 and 75 amp models. Units that require more power may have two 45 amp converters totaling 90 amps. Whenever changing a converter use the same size converter. The wiring and mini breakers in the coach may not be of adequate size to handle a larger converter.

Trouble shooting tips for converters

1. Over heating
   - Caused by cooling fan malfunction or inadequate ventilation. Over heating may cause damage to the converter.

2. Frequency interference
   - Lines or static on television or radio due to converter damage or malfunction

Inverter/Converter

Many Newmar R.V.’s are equipped with inverter/converter combination units. These units serve as a three-stage battery charger and an inverter to supply 120 vac to selected circuits. Units equipped with inverter/converter combinations will also be equipped with a 120 vac sub panel. The sub panel is located next to the main service panel, or if the unit has an EMS, MA and down the main and sub panel are all in one. The sub panel is used to
limit the circuits powered by the inverters. This is necessary to
avoid rapidly draining the coach battery while inverting or
overloading the inverter. AC current is supplied to the
inverter/converter by a 30 amp breaker in the main service panel.
When 120 vac is present, the inverter/converter allows AC power
to pass through the unit and feed the sub panel. The
inverter/converter uses a built in transfer switch to accomplish this.
When AC power is not present, the inverter “when turned on” will
invert DC voltage from the coach battery to AC voltage and feed
the sub panel. DC power is supplied directly from the coach
battery bank. A 300 amp fuse link is in line on the positive lead
from the batteries, this fuse link is located in the battery
compartment approximately 18 inches from the battery connection.
Inverter/converters are equipped with a built in service breaker.
The inverter/converter can be controlled by a panel on the unit or
by remote panel. The remote panel is typically located in the dash
overhead control cabinet. The remote panel is used to control the
inverter and battery charging functions, and monitors these
functions. The remote is also used to access menu and set up
modes.
Note: If a remote panel is plugged into the inverter, the remote
panel takes priority.

Inverter/Converter Trouble Shooting Tips

1. Overheating
   • Caused by cooling fan failure
   • Improper ventilation
   • Causing damage or malfunction of the unit.
2. Irregular operation of equipment
   • Digital clocks and some electronic equipment may not
     function properly due to modified sine wave. This is
     normal.
400 and 600-Watt Inverters

These units are inverter only. They are used to invert DC power to AC power. They are typically used to power entertainment equipment “TV, VCR, DVD, etc.”

And are usually found in a storage compartment. They may or may not have a remote on/off switch located inside the coach. These units have a transfer switch built into the unit to allow AC power to pass through when present. AC power is provided to the unit from an outlet in the storage compartment. DC power is provided to the inverter from mini breakers located in the coaches’ electrical compartment. These units have built-in circuit breaker usually 7.5 amps and have limited power capabilities.

Inverter trouble shooting tips

1. Overheating from improper ventilation causing damage or malfunction of the unit.
2. Breaker Tripping due to over loading of circuit.
   o Re-set breaker on the front of the inverter.

Note: XA-FW’s do have a 1200 watt inverter/converter option, so the inverter is also the battery charger, it is a 70 amp charger built in.

• Make sure you install the correct model in the XA-FW.
Electrical

120v Service - Common Circuits

1. Air Conditioner ........................................ 12-2 wire ...................................... 20 amp breaker
2. Microwave ................................................ 14-2 wire ...................................... 15 amp breaker
3. Water Heater ............................................. 14-2 wire ...................................... 15 amp breaker
4. Light Line .................................................. 14-2 wire ...................................... 15 amp breaker
5. Appliance Line ........................................... 12-2 wire ...................................... 20 amp breaker
6. Washer/Dryer (1 pc) .................................... 12-2 wire ...................................... 20 amp breaker
7. Washer ...................................................... 14-2 wire ...................................... 15 amp breaker
8. Dryer .......................................................... 12-2 wire ...................................... 20 amp breaker
9. Magnum 2012 Inverter
   Power going to ........................................ 10-2 wire ...................................... 30 amp breaker
   Power coming from ................................... 10-2 wire ...................................... 30 amp breaker
10. Appliance line
    Aire Series ........................................... 12-2 wire ...................................... 20 amp breaker
    Star Series ........................................... 14-2 wire ...................................... 15 amp breaker
11. Kitchen Circuit
    Aire Series Only ..................................... 12-2 wire ...................................... 20 amp breaker
12. Converter .................................................. 12-2 wire ...................................... 20 amp breaker

Also, most optional features (such as heat pads, block heaters, dish washers, etc.) will have their own breaker.

Where the Wires Run - Rules of Thumb

1. Circuits, which can be connected from a standing position on the ground outside of the unit, are generally wired horizontally through the side wall.
2. Circuits, which cannot be connected from a standing position on the ground outside of the unit, are generally wired horizontally through the roof wrap of the unit to the others running horizontally across the roof.
3. Power line from power cord to breaker box runs through the floor on most towables.
Newmar Corporation Electrical Service Policy

The following policy is being followed by Newmar Corporation to determine the type of electrical service the unit will receive.

1. Any unit with 2 air conditioners must have a 50 ampere service.
2. No 30 ampere service will have more than 3 major draw items (12 or more ampere draw).
3. The following list shows the various appliances used and their ampere draw.

<table>
<thead>
<tr>
<th>Appliance</th>
<th>Amps</th>
<th>Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Conditioner</td>
<td>14</td>
<td>1680</td>
</tr>
<tr>
<td>Microwave oven</td>
<td>13</td>
<td>1560</td>
</tr>
<tr>
<td>Water Heater</td>
<td>12</td>
<td>1440</td>
</tr>
<tr>
<td>Dryer</td>
<td>12</td>
<td>1440</td>
</tr>
<tr>
<td>Washer</td>
<td>9.8</td>
<td>1176</td>
</tr>
<tr>
<td>Food Center</td>
<td>3.3</td>
<td>396</td>
</tr>
<tr>
<td>Icemaker</td>
<td>2.5</td>
<td>300</td>
</tr>
<tr>
<td>Refrigerator</td>
<td>2.5</td>
<td>300</td>
</tr>
<tr>
<td>Dishwasher</td>
<td>11.5</td>
<td></td>
</tr>
<tr>
<td>TV</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>VCR</td>
<td>0.15</td>
<td></td>
</tr>
<tr>
<td>Freezer</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Trace 2012 Inverter</td>
<td>22</td>
<td>(at 100 DC amp charge rate)</td>
</tr>
<tr>
<td>Trace 2512 Inverter</td>
<td>27</td>
<td>(at 130 DC amp charge rate)</td>
</tr>
<tr>
<td>Magnum Inverter MS2012</td>
<td>15</td>
<td>(at 100 DC amp charge rate)</td>
</tr>
<tr>
<td>Magnum Inverter MS2812</td>
<td>18</td>
<td>(at 125 DC amp charge rate)</td>
</tr>
<tr>
<td>Converter</td>
<td>6.3</td>
<td>(variable, up to 18 amps on start up)</td>
</tr>
</tbody>
</table>