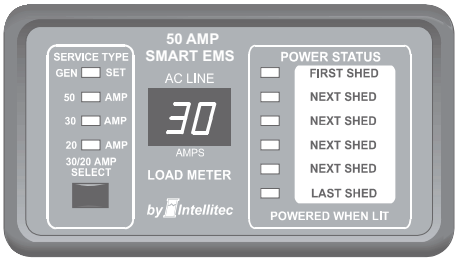
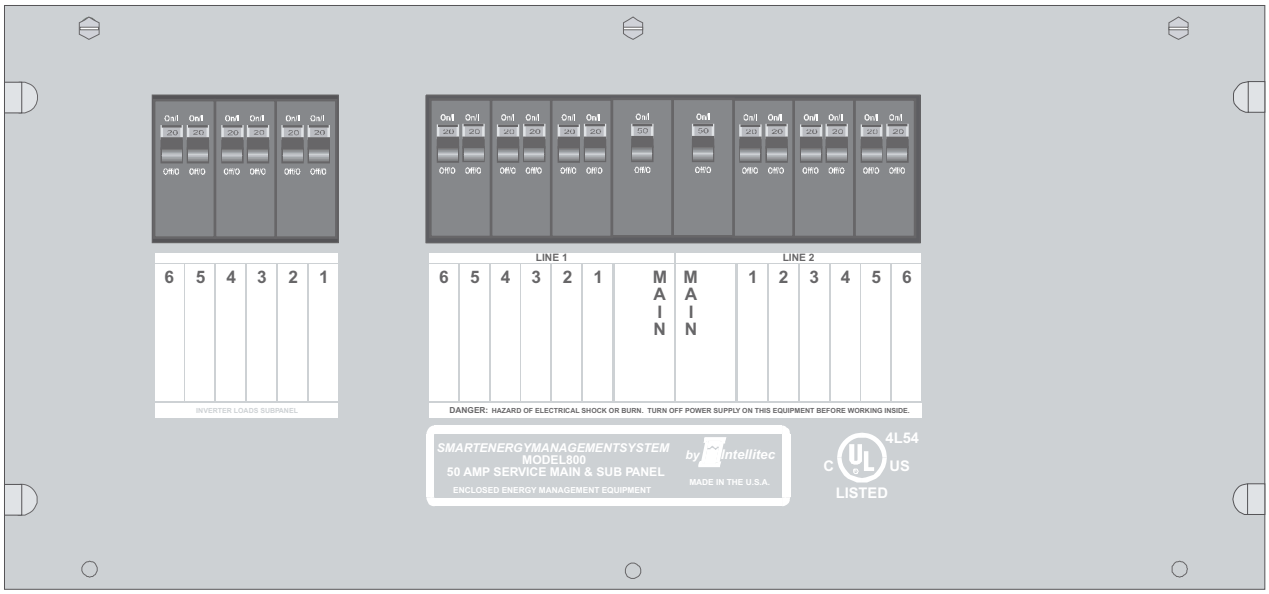
50 AMP Smart Energy Management System™ Model 800

SERVICE MANUAL



50 Amp EMS Display Panel
P/N 00-00684-000



50 AMP EMS MODEL 800 DISTRIBUTION PANEL
P/N 00-00683-300

CAUTION

*The 50 AMP SMART EMS - Model 800 i*s a centralized power switching, fusing and distribution center. Power from the 120/240 volt power source is fed into the box. The potential of lethal electrical shock is present in this box. Inadvertent shorts at this box could result in damage and/or injury. All servicing of this box should be done ONLY by a qualified Service Technician.

Diagnostic tools required: Low current Test Light, Accurate Voltmeter (digital read-out preferred), Clam-on AC ammeter.

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50 AMP Smart Energy Management System™ Model 800

The 50 Amp Smart EMS™ Model 800 consists of two elements: the Display Panel and the Model 800 Distribution Panel. The Display Panel is mounted on a wall, or suitable surface remotely from the Distribution Panel and convenient to the user. The Model 800 Distribution Panel is a completely self-contained 120/240 volt power distribution and energy management system intended tp be used in recreational vehicles. It is housed in a sheet metal enclosure with removable front panel. It provides circuit protection for all the 120 VAC loads in the RV and a system of energy management to minimize the over-loading and tripping of circuit breakers. In addition, the Model 800 Distribution Panel incorporates a sub-panel to accommodate inverter/converter connected loads.

Circuit Breakers - The 50 Amp Smart EMS™ Model 800 Main Distribution Panel offers slots for eight single or dual, standard 120 volt circuit breakers. Two of these breakers, located in the two center stab positions, must be a 50 Amp Unit that act as a main input protection for each of the lines supplying the reminder of the branch breakers (up to 12.) An additional sub-panel provides slots for three single or dual standard 120 volt circuit breakers for loads connected to the 120 VAC output of an inverter/converter.

Energy Management - The 50 Amp Smart EMS™ Model 800 automatically senses the available power to the vehicle. It determines whether it is connected to a 120 VAC - 30 Amp shore power source, 240 VAC - 50 Amp shore power source, or Generator source. Depending upon available power, it controls the operation of 6 possible loads that may include: the front and rear air conditioner fan and compressor using low voltage switching and other 120 Volt loads, such as the refrigerator, water heater, washer/dryer, microwave oven, or other large appliances. These appliances may be any type load, but are typically heavier loads, those whose use can be “postponed” until a time when current is available for their use. If the available power source is 120 VAC - 30 Amp shore power, it attempts to keep the total 120 volt current draw to less than 30 Amps.

HOW IT WORKS

The **50 AMP SMART EMS™ Model 800** provides main circuit protection for 120/240 VAC single phase incoming lines and branch circuit protection for up to 12 circuits, including Energy Management of up to six selected branch circuits. A sub-panel is available on the Model 800 for up to 6 sub-breakers for inverter connected loads. If 120 VAC - 30/20 Amp source is available, the control helps to limit the total current draw of all the appliances in the RV at or below 30/20 Amps provided by the main power feed.

Circuit Protection:

Circuit protection for ALL the 120 VAC loads is offered by standard, reset-able circuit breakers, provided by the installer. There are eight positions available for circuit breakers on the Main Distribution Panel. The breakers located in the two center stab positions must be 50 Amp breakers to act as the main breakers for the entire system. These breakers back-feed power into the circuit breaker bus to feed power to the branch breakers. The remaining six positions on the Main Distribution Panel may be occupied by single or dual units. All the loads in the RV, including the inverter/converter, are fed from the branch breakers. The 120 VAC output of the inverter is fed to a sub-panel containing three positions that may be occupied by single or dual units.

Energy Management:

Note - When connected to 50 Amp - 240 VAC service or generator service, the Energy Management features of the unit are disabled and the unit switches all controlled loads"ON".

The main neutral line is routed through the magnetically coupled current sensor, which measures the current flowing through the neutral line. This is the total amount being drawn by all the 120 volt appliances in the RV when the available power service is 120 VAC. When this current exceeds 30 Amps (20 Amps if the threshold has been set lower), and 240 VAC or generator service is not available, the **50 AMP SMART EMS™** will turn off the controlled loads in an effort to bring the total current to the limit of the incoming service.

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Controlled Loads:

The system offers control of up to six powered loads; each one connected to one of the relay circuits of the **50 AMP Smart EMS™** system. Four of these relays, relays 1, 2, 3, and 4, are 30 Amp relays with normally-open contacts used to interrupt the 120 volt power to the loads. These circuits are intended to control 120 volt appliances such as refrigerator, water heater, washer/dryer, coffee maker, etc.

For the 120 VAC switched loads, power is routed from the individual branch circuit breakers to one of these 120 VAC relays on the Control Module. The controlled load is then fed from that relay.

The remainder of the relays, relays 5 and 6, are intended to switch low voltage loads. Relays 5 and 6 are single-pole, double-throw relays with all contacts available. These relays are intended to control air conditioners, or other appliances equipped with low voltage controls or thermostats. The contacts of the relays are typically wired in series with the low voltage controls, or thermostats of air conditioners so the **EMS** turns off only the compressor, or the compressor and fan. These circuits could also control other 120 volt appliances if an additional control relay is added externally.

OPERATION IN VEHICLES USING AVAILABLE SERVICE:

If 120 VAC or 240 VAC is not available at the L1 or L2 inputs (J6 pin 3 and 1 respectively) on the Control Module, the **EMS** shuts itself off. This feature is intended to prevent the **EMS** from drawing current from the +12 VDC battery supply when not in operation.

When 120 VAC or 240 VAC power is applied, the system automatically powers up and determines the nature of the power source.

If 240 VAC, 50 Amp service is available, the energy management feature is disabled and all control relay contacts are closed, energizing all of the controlled loads. The Control Module sends a signal to the Display Module which causes the load meter to go blank, the 50 AMP service indicator to light, and all power status indicators to light.

If the generator is running, 120 VAC will be present at the L1 and L2 inputs and a +12 VDC signal will be present at J2 pin 2 on the Control Module. In this mode the energy management feature is disabled and all control relay contacts are closed, energizing all of the controlled loads. The Control Module sends a signal to the Display Module causing the load meter to display actual load current, the GEN SET service indicator to light, and all power status indicators to light.

If 120 VAC is present at the L1 and L2 inputs and no +12 VDC signal is present at J2 pin 2 on the Control Module, the **EMS** will assume that 120 VAC, 30 Amp shore power is available and the energy management feature will be enabled. If only 20 Amp service is available, the user must select the 20 AMP service mode by momentarily pressing the 20/30 Amp select switch on the Control Panel. Initially, all relay contacts are closed, and the total current is monitored. If the total current should exceed the service limit, the system will turn off the first load in the shedding table. As it turns the loads off, it calculates the amount of current that was removed, which is the value for that load. This value is placed in memory. If the current remains above the service limit the system will turn off the next load in the shedding table. Again, it calculates the amount of current that was removed and places this value, which is the value for that load, in memory. The system continues to turn off loads until the total current falls below the service limit or all of the six controlled loads have been shed. Thru this process the system has "learned" the amount of current that each particular load draws. This feature compensates for the differences in current draw over a range of line voltage and ambient temperature, by re-learning the load each time it is turned off or "shed".

The **50 Amp Smart EMS™** now waits until the total current is lower than the service limit and enough current is available (as compared with the amount in memory for the last load shed) before it will turn that load back on. This assures that there is sufficient current to operate the load.

Note: There is a two minute minimum delay period after a load is shed before the load will be turned back on again to prevent air conditioners from turning on with a head of pressure.

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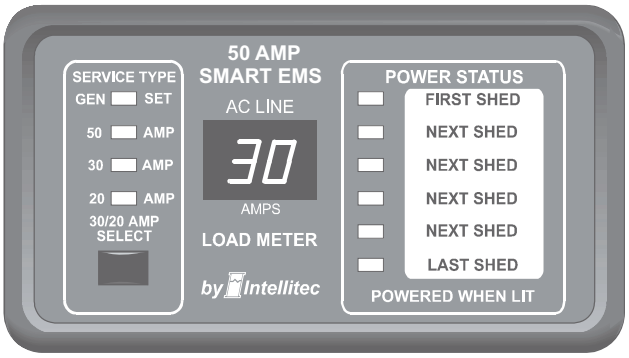
50 AMP Smart Energy Management System™ Model 800

3 HOUR AVERAGING

The R.V.I.A. (Recreational Vehicle Industry Association) in conjunction with the N.E.C. (National Electrical Council) have established rules regarding the rating of electrical systems and the use of energy management systems. One of these rules requires that, if an energy management system is used, the average total load current for the system over a 3 hour period be limited to 80% of the service rating. For that reason the **50 amp EMS™** calculates the average running current for the system and, if it exceeds 80% of the service rating, the **EMS** sheds loads to reduce the average current below that limit.

For example, if a system operating under 120 VAC, 30 Amp service has been running at the 30 Amp limit for three hours, the **EMS** will change its shedding threshold to 24 Amps and turn off loads until the 24 Amp limit is attained. If the user selects the 20 Amp service mode this limit will translate to 16 Amps. Because the **EMS** calculates a running 3 hour average, if the average load current drops below the limit, the system will restore power to loads based on their impact on the limit. If the system is in the Averaging mode the decimal point at the lower right corner of the Load Meter display on the Display Panel will illuminate.

DISPLAY PANEL



The Display Panel can be mounted remotely and connects to the main unit with a light gauge, four wire cable.
Six Power Status LED's indicate power is applied to those loads. These LED's are on when the power is applied.
The Load Meter has a two digit display to **indicate the amount of current actually being drawn** by all the appliances in the coach.

Four Service Type LED's indicate the source for 120/240 VAC power. Three of these sources are automatically detected and indicated by the **EMS**, namely: Gen Set service, 50 Amp 240VAC service, and 30 Amp 120 VAC service.

The 20 Amp service mode is not automatically detected and the operator must manually select the 20 Amp mode when 20 Amp service is available. The Service Select button allows the current threshold to be set to either 30 Amps pressing this button again will switch the system back to the 30 Amp mode.

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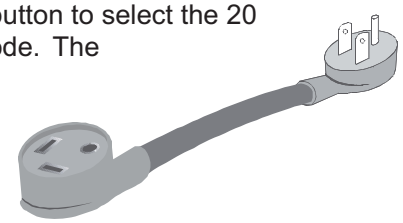


If the pictured adaptor is used on the incoming service, press the service select button to select the 20 Amp mode. When power is first applied, the system will always be in the 30 Amp mode. The 30/20 Amp indicator LED will be on when the system is in the 30 Amp mode. Momentarily pressing this button will switch the system to the 20 Amp mode. Momentarily pressing this button again will switch the system back to the 30 Amp mode.

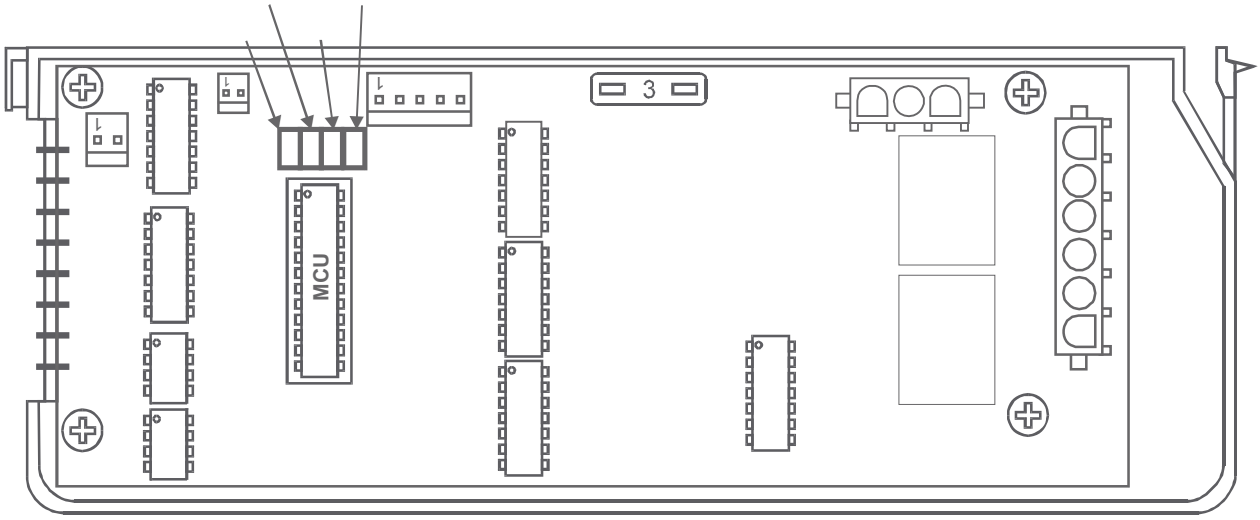
The Display Panel can also be used to display the value of current stored in memory for each of the six loads. To display the values of current stored in memory for each of the six loads, push and hold the Service Select button. The uppermost LED will illuminate, and the stored value will appear on the Load Meter. Pushing Service Select again will cycle to the next load. After the last stored value has been displayed the unit will display average current, if the unit is in the AVERAGING mode (indicated by the decimal point in the lower right corner of the Load Meter). Otherwise the Load Meter will return to normal operation and display total current draw.

INSTALLATION

The Control Module:

The first step when installing an EMS is to determine which loads will be controlled, and in what order they will be shed. A typical scheme would be to control the two air conditioners, the water heater, and the washer/dryer. With these loads, the first load to be shed should be the water heater, as its loss of operation would be the least noticed (it would switch to operate on gas if needed). The next would be the bedroom air; the third would be the washer dryer, and finally the main air. Choosing this sequence would provide the least inconvenience to the occupants.

The EMS Control Module has three jumpers on the board that determine the order of shedding of the loads. These jumpers are labeled JP2, JP3, and JP4. (See figure below). JP1 is reserved for future development.



50 AMP EMS CONTROL MODULE - LOW VOLTAGE CONNECTION SIDE

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These jumpers are all installed at the factory. Removing JP2, JP3, or JP4 will alter the order of shedding to suit the particular need of the installation. The following tables will assist in determining the proper settings for the three jumpers.

The first step is to fill in the blanks with the names of the loads you want the system to shed, in the order they are to be shed, with the first to be shed at the top. Then, fill in the second, "Load Type", column with an "A" or a "D", an "A" for a 120 VAC controlled load such as a washer/dryer, or a "D" for DC controlled load, such as a thermostat wire. You can select a maximum of 4 AC and 2 DC relays.

LOAD NAME (First to Shed at Top)	LOAD TYPE	1	2	3	4	5	6	7	8
		D	A	A	A	A	D	A	A
		D	D	A	A	A	A	D	A
		A	D	D	A	A	D	A	D
		A	A	D	D	A	A	D	A
		A	A	A	D	D	A	A	D
		A	A	A	A	D	A	A	A

Next, looking across the other eight columns, find the one that matches the "Load Type" column you just filled in. Using the number at the top of the column, look in the table below to determine the settings of the three jumpers, JP2, JP3, and Jp4. A "Y" (for yes) means the jumper should be installed and an "N" (for no) means there should not be a jumper installed.

COLUMN NUMBER	1	2	3	4	5	6	7	8
JP2	Y	Y	Y	Y	N	N	N	N
JP3	Y	Y	N	N	Y	Y	N	N
JP4	Y	N	Y	N	Y	N	Y	N
RELAY SHED ORDER (Top is First Shed)	6	4	4	4	4	6	4	4
	5	6	3	3	3	4	6	3
	4	5	6	2	2	5	3	6
	3	3	5	6	1	3	5	2
	2	2	2	5	6	2	2	5
	1	1	1	1	5	1	1	1

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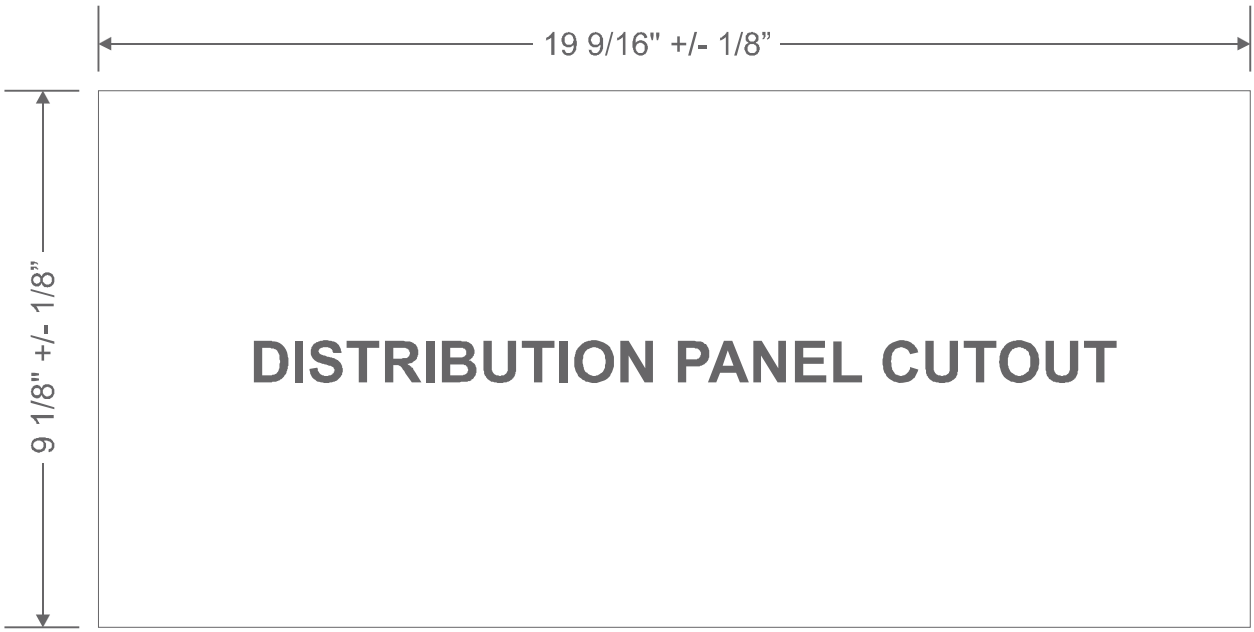
At the bottom of the column is the Relay Shed Order. This determines which relays will be used for each load. The one at the top of the column is first to be shed. The one below it will turn off next, and so forth. The loads ***MUST*** be wired in this order for the system to operate as desired.

Finally, the number and size of the circuit breakers should be selected to meet the needs of the installation. The breakers can be either single or dual types. The center two breakers on the Main Distribution Panel MUST be 50 Amp units to act as the Main breakers. The breakers must be obtained and then installed in the box.
(See information on breaker types later in this manual.)

Distribution Panel:

The EMS Distribution Panel should be installed in a convenient location where it can get air circulation to keep it from over heating. There should be a minimum of 7" of depth behind the mounting surface to provide enough room for the box and wiring.

A hole should be cut in the mounting panel as shown.



This opening must be cut carefully to be sure the mounting screws will have enough wood to hold and there is enough clearance around the box for the front cover screws.

The wiring to the box should be routed through the holes in the back and secured using approved cable connectors. The wires should be **Copper conductors ONLY,** with the appropriate size and insulation to meet N.E.C.

The main supply cable should be brought through the large hole in the lower center of the box and secured with an appropriate connector. The "LINE 1" and "LINE 2" supply mains should be connected to the corresponding main breaker. The main ground lead should be connected to the nearest GROUND bar terminal strip. The current sensor should be mounted in a knock-out hole near the insulated NEUTRAL block so that the signal leads from the current sensor exit the rear of the box. These signal wires should be routed through the lower right hole into the low voltage section of the EMS and connected to J3, a 2 pin connector on the low voltage side of the Control Module. The inverter/converter should be wired so that the AC input to the inverter/converter is supplied via a branch breaker on the Main Distribution Panel and the 120 VAC output of the inverter/converter wired to the individual lug on the far right side of the sub-panel.

The main NEUTRAL wire should be routed through the CURRENT SENSOR and connected to an appropriate position on the insulated NEUTRAL block.

There are 8 positions for circuit breakers on the Main Distribution Panel and 3 positions for circuit breakers on the Sub-Panel in the box. The circuit breakers can be single or dual types. The breakers in the two center positions of the Main Distribution Panel **Must** be rated at 50 Amps to be used as the Main Breakers.

The following breakers are suitable for MAIN and BRANCH breakers:

Eaton Cutler-Hammer: BR, BD, GFCB, Filler Plate BRFP
Siemens-DPD: QP, QT, Filler Plate QF3

The replacement circuit breakers must be of the same type and rating.

Branch circuit wires should be routed through the remaining knock-out holes in the back of the box. The wires should be stripped and the ground wire of each cable connected to the GROUND bar terminal strip. The white or neutral wires should all be connected to the NEUTRAL bar terminal strip. The black, or "hot" leads of all the uncontrolled loads should be connected to their associated breakers. **Each terminal screw should be tightened to *16* in.-lb. of torque.** *(See the box drawing.)*

If removed during installation, the white jumper wire should be re-installed between the NEUTRAL block and J6, terminal 5 of the **EMS** module labeled "NEUTRAL". *(See box drawing, page 15.)*

To connect the 120 volt controlled loads, jumper wires should be connected from the respective circuit breakers to the associated screw terminals of J6 and J7 on the EMS control module.

> **NOTE:** To insure proper operation of the source sensing circuitry on the 50 AMP EMS, jumper wires must always be connected from a line 1 breaker to J6 terminal 3, and from a line 2 breaker to J6 terminal 1. These connections must be made even though Relay 1 or Relay 2 may not be used for controlled loads.

The black wires to the controlled loads should be connected to the proper relay output screw terminals of J6 and J7 on the EMS control module. Be sure these wires are under the screw terminals and that they are tight.
The connections are as follows:

J6 Terminal	**Function**	
1	From Circuit Breaker for Relay 2	(**Must be connected to a LINE 2 Breaker**)
2	Output of Relay 2	
3	From Circuit Breaker for Relay 1	(**Must be connected to a LINE 1 Breaker**)
4	Output of Relay 1	
5	Neutral	
J7 Terminal	**Function**	
1	Output of Relay 3	
2	From Circuit Breaker for Relay 3	
3	Output of Relay 4	
4	From Circuit Breaker for Relay 4	

NOTE: J6 and J7 terminal blocks - Will accept up to 12 GA or 14 GA copper wire *ONLY.*

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The 12 VDC voltage connections are made through J2, a 3 pin Mate-N-Lok connector on the low voltage side of the control module. The +12 volts should be supplied from a source fused at 3 Amps minimum and capable of delivering up to 1 Amp of AVERAGE current. Protecting this connection with a higher rated fuse is acceptable since the EMS is internally protected with a 3 Amp fuse.
The connections are as follows:

J2 Pin	Function
1	+ 12 Volts
2	Gen Set Run Input
3	Ground

The low voltage controlled load connections are made through J4, a 6 pin Mate-N-Lok connector on the low voltage side of the control module.
The connections are as follows:

J4 Pin	Function
1	Relay 5 Normally Open
2	Relay 5 Common
3	Relay 5 Normally Closed
4	Relay 6 Common
5	Relay 6 Normally Closed
6	Relay 6 Normally Open

The low voltage controlled load relay connections are typically made to the thermostat wires of the air conditioners. The normally open contacts are wired in "series" with the thermostat. This means that the thermostat wire is cut and the two ends are wired to the Common and the Normally Open contacts of the relay/s. In this way, the EMS can interrupt the operation of the compressor just as the thermostat does. The low voltage wires are brought into the box through the large hole in the lower right-hand corner of the back of the box.

There are several methods to utilize Relay 5 and 6 connections for controlling air conditioner systems with the EMS:

1) If only the compressors of the front and rear A/C's are to be controlled, connections are typically made to the low voltage compressor control wires of the air conditioners. The normally closed contacts are wired in "series" with the compressor control lead. This means that the compressor control wire is cut and the two ends are wired to the Common and the Normally Closed contacts of Relay 5 or 6. In this way, the EMS can interrupt the operation of the compressor, just as the thermostat does.

2) If both the compressors and fans of the front and rear A/C's are to be controlled, connections are typically made to the low voltage thermostat control wires of the air conditioners. The normally closed contacts are wired in "series" with each thermostat control lead. This means that the thermostat control wire is cut and the two ends are wired to the Common and the Normally Closed contacts of Relay 5 or 6. In this way, the EMS can interrupt the operation of the compressor and fans, just as the thermostat does.

3) If the compressor and fan for one of the A/C systems are to be controlled individually, connections are typically made to the individual low voltage thermostat control wires for the fan and compressor of the air conditioner. The Relay 6 connections are typically made to the low voltage compressor control wires of the air conditioner to control the compressor. The normally closed contacts are wired in "series" with the compressor control lead. This means that the low voltage compressor control wire is cut and the two ends are wired to the Common and the Normally Closed contacts on Relay 6. The Relay 5 connections are typically made to the low voltage thermostat control wires of the air conditioner to control the fan. The normally closed contacts are wired in "series" with the thermostat control lead. This means that the low voltage thermostat control wire is cut and the two ends are wired to the Common and the Normally Closed contacts on Relay 5. In this way, the EMS can interrupt the operation of the fan, just as the thermostat does.

Finally, on the Control Module, there is a small 2 pin plug labeled J1 which is only used for the High Pot Test on the system. When the two pins are shorted together, the EMS will operate without the presence of 120 VAC.

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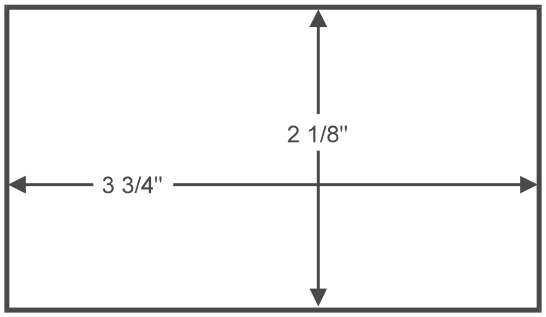
Now the **50A EMS Model 800 Distribution Panel** should be moved into the mounting hole, being careful not pinch any of the wires. It should be screwed in place using four # 8, round head screws into the 4 holes in the side flanges. The front cover should be secured into place with the 6 screws provided in the holes in the top and bottom flanges.

DISPLAY PANEL:

Select a convenient location for the panel, where it can be easily viewed by the owner.
Cut a hole for the panel as shown.



Remote Panel Cutout

A two foot long double ended pigtail is available as Intellitec P/N 11-00589-002. This pigtail may be cut in half and up to 40 feet of additional cable may be spliced into the harness. Route the harness from the hole for the display panel to the EMS. Plug the cable into J5 on the EMS Control Module, assuring it is properly seated on all four pins. (Note: This cable is polarized, the latches of each end of the connector mate to each other, and will go on easily in the right direction, but can be forced on in the reverse direction.)

The Display Panel should be plugged onto the harness observing the polarity as before. The panel should then be installed in the hole and screwed in place using two # 6, flat head screws through the holes in the panel. A white function label should be lettered to correspond to the order of load shedding and installed behind the cover label. The cover label should be placed against the front panel and the trim bezel snapped on to hold the label in place.

PERFORMANCE TEST

The system is now ready for testing.

Hi-POT TEST:

At the installers preference, to assure there are no potential shorts, a Hi-Pot test can be performed on the installation. To do this, +12 volts must be applied to the system. A jumper wire must be installed to tie the two pins of the “Hi-Pot Test" plug, J1, to turn the system on without the presence of 120 volt power. This plug is located on the right side of the EMS Control module. The relays on the module should be heard clicking as they pull in. On the Display Panel, the LED's should light and the numeric display should read "0". The Hi-Pot test should now be conducted in accordance with standard procedures for the tester being used. Assuming the system passes, the covers should be taken off and the jumper removed from J1. If not, the problem must be corrected before proceeding further.

SYSTEM TEST:

All the 120 volt loads should be turned off or disconnected. Both 120 volt AC and 12 volt DC power should now be applied to the system. When this is done, the relays should be heard pulling in. On the Display Panel, the numeric display should read "0", the six Power Status LED's should come on, and the "30 Amp" Service Type LED should light. A clamp-on type ammeter should be used to measure the current being supplied by the 30 Amp shore power cord.

Connect or turn on one of the controlled AC loads. It should operate and the numeric display or the clamp-on ammeter should show the amount of current that load is drawn. Turn that appliance off and repeat this with each of the others.

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To test the load shedding, turn on all the controlled appliances. The total current drawn should exceed 30 Amps. (If not, add additional loads to the non-controlled receptacles.) When the total amount of current exceeds 30 Amps, the loads should begin to turn off to bring the total below 30 Amps.

FUSES

F1 - 3 Amp ATO type, for EMS Control Module circuitry only. **DO NOT replace with a fuse of higher rating.** This could result in severe damage to the circuitry or create a possible fire hazard.

EMS CONTROL MODULE PLUGS, PINS, AND FUNCTIONS:

J1 = 2 pin Molex KK-100 connector - HI-POT TEST Power Up

Pin	Function
1	Hi-Pot Override
2	Hi-Pot Override

J2 = 3 pin Amp Mate-n-Lok connector - Power connector

Pin	Function
1	+12 Volts Supply
2	+12 Volts Gen-Set Run input
3	Chassis Ground

J3 = 2 pin Molex KK-156 - Current Sensor Connector

Pin	Function
1	Current Sensor Input
2	Current Sensor Input

J4 = 6 pin Amp Mate-n-Lok connector - Control Relays 5 & 6 contacts

Pin	Function
1	Relay 5 N.O.
2	Relay 5 COM.
3	Relay 5 N.C.
4	Relay 6 COM.
5	Relay 6 N.C.
6	Relay 6 N.O.

J5 = 4 pin Molex KK .156 - Display Panel Connector Mating Housing Molex 09-50-3041

Pin	Function
1	Power
2	Data
3	Ground
4	30/20 Amp Select Line

J6 = 5 Position Terminal Block

Term	Function	
1	From Circuit Breaker for Relay 2	(**Must be connected to a LINE 2 Breaker**)
2	Output of Relay 2	
3	From Circuit Breaker for Relay 1	(**Must be connected to a LINE 1 Breaker**)
4	Output of Relay 1	
5	Neutral	

J7 = 4 Position Terminal Block

Term	Function
1	Output of Relay 3
2	From Circuit Breaker for Relay 3
3	Output of Relay 4
4	From Circuit Breaker for Relay 4

NOTE: J6 and J7 terminal blocks - Will accept up to 12 GA or 14 GA copper wire ONLY.

Trouble Shooting

If the following problems occur, proceed with analysis in the order in which these steps are listed.

I. No 120 volt appliances working.

A. Check incoming power source.

1. Make sure the shore power cord is plugged into the outlet.

2. Check the circuit breaker at the shore power outlet to be sure it is set. Turn it off and then back on to be sure.

3. Check the 50 Amp Main circuit breakers in the EMS Distribution Panel to be sure they are set. Turn them off and then back on to be sure.

4. Using a circuit checker, be sure the 30 Amp shore power outlet has 120 volts available.

B. Check Change-Over relay, if so equipped.

1. Measure the voltage at the incoming side of the Main 50 Amp breaker. If voltage is NOT the same as the incoming line, repair the change-over. (Refer to the change-over service literature for trouble shooting.)

II. 120 volts available at non-controlled appliances and receptacles. Controlled appliances do not operate.

A. Check the 12 volt power to the EMS module.

1. Check 12 volt, 3 Amp fuse on EMS Control Module. Replace if necessary.

B. Check 120 volt circuit breakers in EMS.

1. Reset circuit breakers if necessary.

2. Check for presence of voltage at branch circuit breakers with voltmeter.

3. Check for presence of voltage at EMS terminals with voltmeter.

4. Check wire from EMS Control Module to neutral bar is installed.

III. Some controlled appliances turn on, others do not.

A. Reduce total current, appliance may be shed.

B. Check wiring to and from EMS Control Module.

1. Check wiring from circuit breakers to EMS Control Module.

2. Check wiring from EMS Control Module to controlled appliance.

3. Check for power at associated EMS relay terminal.

IV. Branch circuit breaker trips when power is applied.

A. Check wiring for shorts.

V. Air conditioner doesn't work.

A. Check thermostat wiring and settings.

B. Check air conditioner

Trouble Shooting

VI. Shedding order incorrect.

A. Check jumper setting per Figure on page 5 and Tables on page 6.

B. Check relay wiring per Table on page 6.

VII. Remote Display out or strange characters are displayed.

Check wiring between J5 on EMS Control Module and Display Panel.

Pin	Function	Voltage
1	Power	12V
2	Data	Ground
3	Ground	Ground
4	Select Line	Ground, 12V when pressed

Wiring 1 1 2 2 3 3 4 4

Both the EMS Control Module and Display Panel have internal protection. Shorts or mis-wiring should not cause the units to fail.

VIII. Remote Display does not indicate "GEN SET" service source when generator is running.

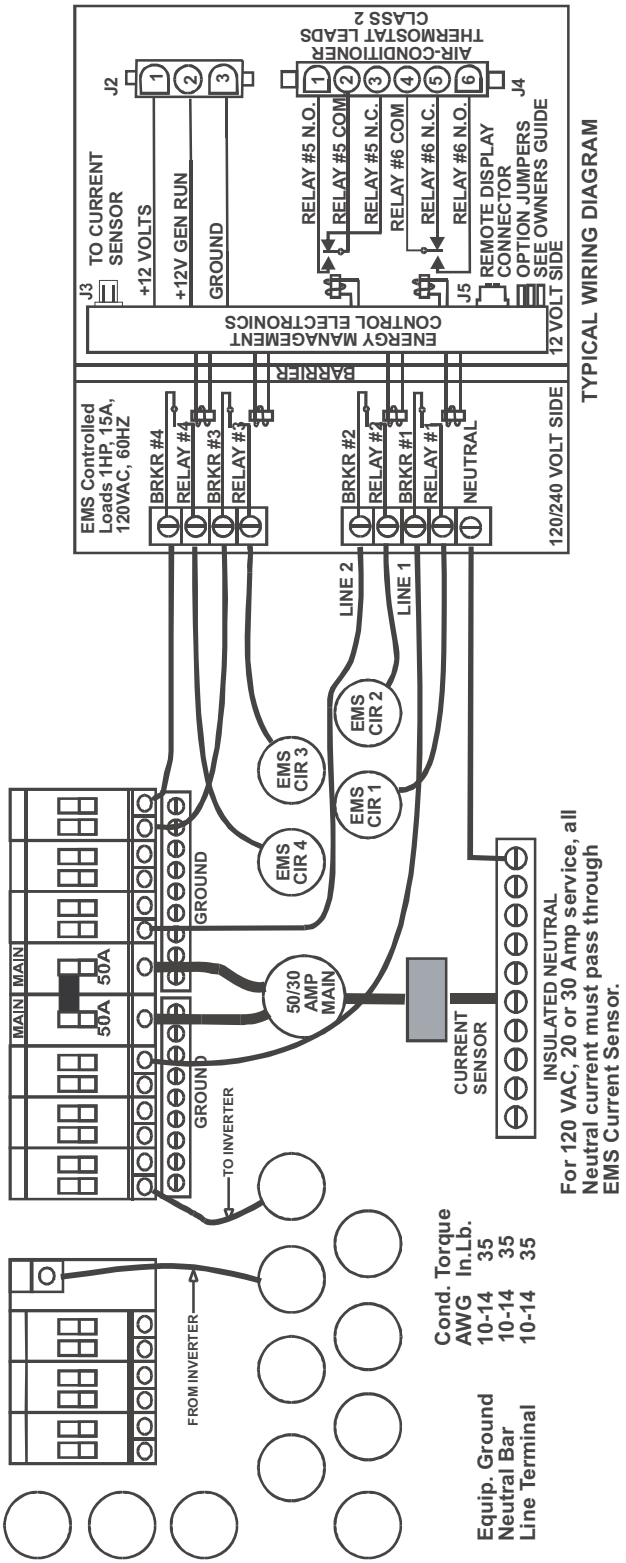
Check wiring between generator run light circuit and J2 pin 2 on EMS Control Module. J2 pin 2 should measure +12Vdc or greater when generator is running and 0 Vdc otherwise.

VIX. Remote Display does not indicate "50 AMP" service source when 50 Amp 240 VAC shore power is Connected.

Check to make sure that jumpers are present between any LINE 1 breaker and J6 terminal 3, and any LINE 2 breaker and J6 terminal 1. Also check that the "NEUTRAL" jumper is in place, between J6 terminal 5 and a position on the NEUTRAL block.

With "50 Amp" service available the voltage between J6-3 and J6-1 should measure 240 VAC. With any other source the voltage between J6-3 and J6-1 should measure 0 VAC. In addition, the voltage measured between J6-3 and J6-5 should be 120 VAC and the voltage measured between J6-1 and J6-5 should be 120 VAC.

50 AMP Smart Energy Management System™ Model 800



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