

# Standard Features

- Main Battery bank monitoring
- Isolated Battery monitoring
- Electrical Load Sequencing
- Electrical Load Shedding
- Over Voltage Indication
- High Idle Control
- Automatic or Manual Reset Modes
- Reverse Polarity / Short Circuit Protected
- Rugged Metal Enclosure
- LED Status Display
- Battery Warning

## Available Features

- Positive or Ground Master Switch
- Integral Relay Distribution Board
- Positive or Ground Output for Loads

# Standard Features

## **Sequence** (J3d)

This mode will performs the function of sequencing the electrical loads on and off.

## **Automatic Load Reset** (J2b)

Any load which has been shed will automatically be controlled off for a minimum of five minutes, regardless of the state of the electrical system. After the electrical system becomes stable, the loads will be controlled back on by the system. Any shed load can be turned on immediately by performing a manual load reset (see next section).

## **Manual Load Reset** (J2a)

When this mode is enabled, any load which has been shed will remain off until the system manager is manually reset.

## **Manually Resetting the System**

There are two levels of manual reset. LOAD RESET and FULL RESET.

**Load Reset:** The shed loads are manually reset by toggling the master switch off and then on again within two (2) seconds. When a load reset is performed, all loads which are currently shed of will be sequenced on. The system manager will refrain from shedding any load for fifteen minutes. After fifteen minutes, normal operation of the system manager will resume.

**Full Reset:** Full system reset will occur when the master switch is turned off for at least two seconds. After full reset, the loads will be sequentially turned off and the system will resume normal operation when the master switch is toggled to the on position.

## **Over-Voltage Indicator** (J4d)

The system manager continually monitors the system voltage and will activate an output when it detects that the constant system voltage has increased above 14.5 volts. As in all modes, the system will not react to the spurious voltage transients which may exist in the electrical system as loads and devices are cycled.

## **Fast Idle Control** (J4c)

The system manager is capable of becoming a part of a system which controls a fast idle device. The fast idle output will activate whenever the system voltage is low. The output will deactivate if the system manager is reset or the voltage becomes good.

This circuit must only be utilized when the appropriate interlocks are present.

# Battery Warning

The Battery Warning feature is a special output which indicates different states of the electrical system. The Class 1 system manager continuously monitors the rate of discharge (voltage drop per unit time) of the electrical system. The Battery Warning indicator will flash at a rate proportional to the discharge rate. More simply, the faster that the voltage is dropping, the faster the indicator will flash.

When sudden voltage drops are recognized by the system, the light will flash quickly for three seconds to indicate an instantaneous voltage drop. After the quick flash, the indicator will revert back to its previous flash rate.

Once the voltage has dropped to a critical level which requires loads to be shed, the indicator will burn steady and remain on as long as there are loads in the shed state or loads are in the manual reset state and voltage is low.

The Battery Warning option can assist an operator in identifying a potential low voltage situation in advance giving the opportunity to react to a poor voltage situation before it happens.

**NOTE:** Refer to the section titled “Specifications” at the end of this manual for more descriptive information on these available modes.

## The indicator panel consists of four LED’s:

### POWER ON (GREEN WIRE)

This LED illuminates when power is applied to the System Manager.

### BATTERY WARNING (YELLOW WIRE)

This LED is connected to terminal TB#8 and flashes when system voltage drops below 13.2 VDC.

### ISOLATED BATTERY LOW (BLUE WIRE) OPTION

This LED is connected to TB#7 and illuminates when an auxiliary battery’s voltage drops below 11.8 VDC for more than two minutes.

### OVER-VOLTAGE OR FAST IDLE (BROWN WIRE)

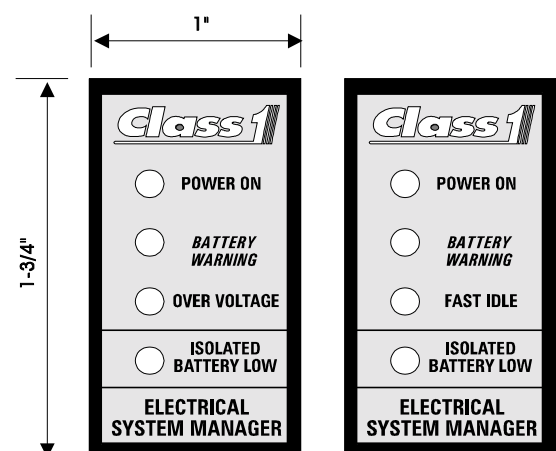
This LED is connected to TB#15.

### GROUND (BLACK WIRE)

Connected to a good ground source.

## STANDARD PANEL DISPLAY

The *Class1* Electrical System Manager is supplied with an indicator panel. The indicator panel is designed to fit in a standard rocker switch cut-out (7/8” x 1-1/2”).



# System Configuration

The Electrical System Manager is configured by the use of five jumpers labeled J1 through J5.

J1 and J5 control battery monitoring (MAIN or MAIN and ISOLATED.)

J2 controls the load reset method (MANUAL or AUTOMATIC.)

J3 controls Load Sequencing (OFF or ON.)

J4 controls when Terminal bar #15 is active (Low Voltage or High Voltage.)

The System Manager cover must be removed to change its operating mode.

J1 through J4 are located at the lower right edge of the circuit board, J5 is located next to TB #10.

JMP	DESCRIPTION	POSITION A	POSITION B	POSITION C	POSITION D
J1	BATTERIES	MAIN	MAIN/ISOLATED		
J2	RESET	MANUAL	AUTO		
J3	SEQUENCE			OFF	ON
J4	TERMINAL #15 FUNCTION			FAST IDLE CONTROL	OVER-VOLT LIGHT
J5	JUMPERS	MAIN	MAIN/ISOLATED		

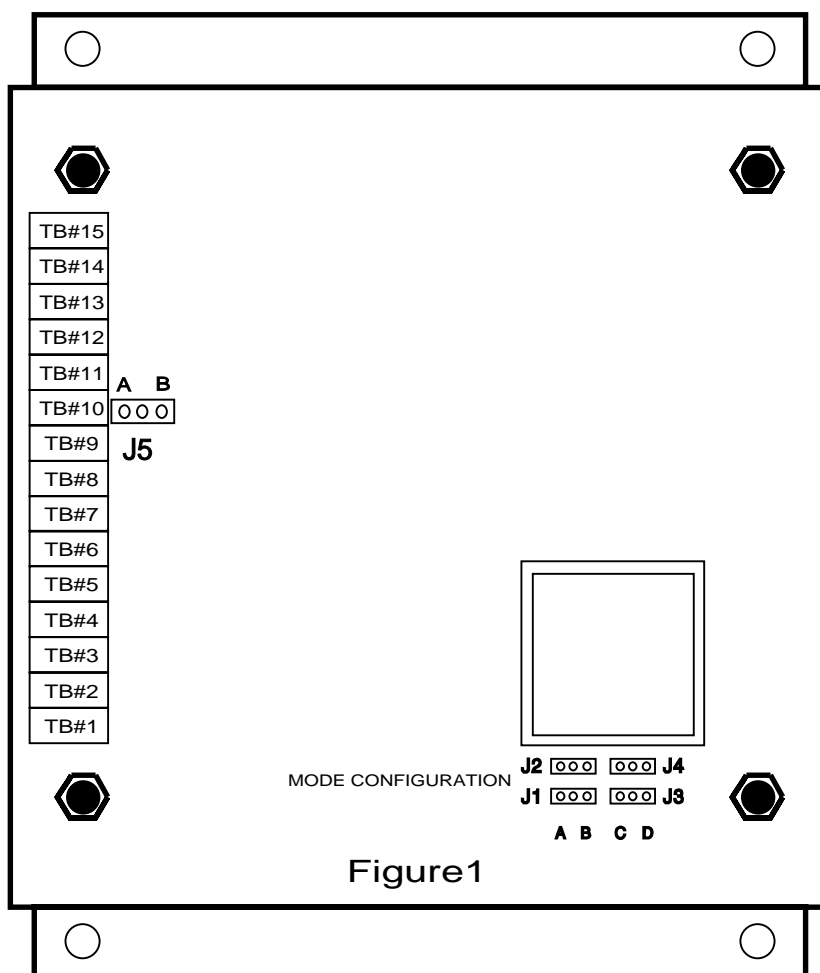


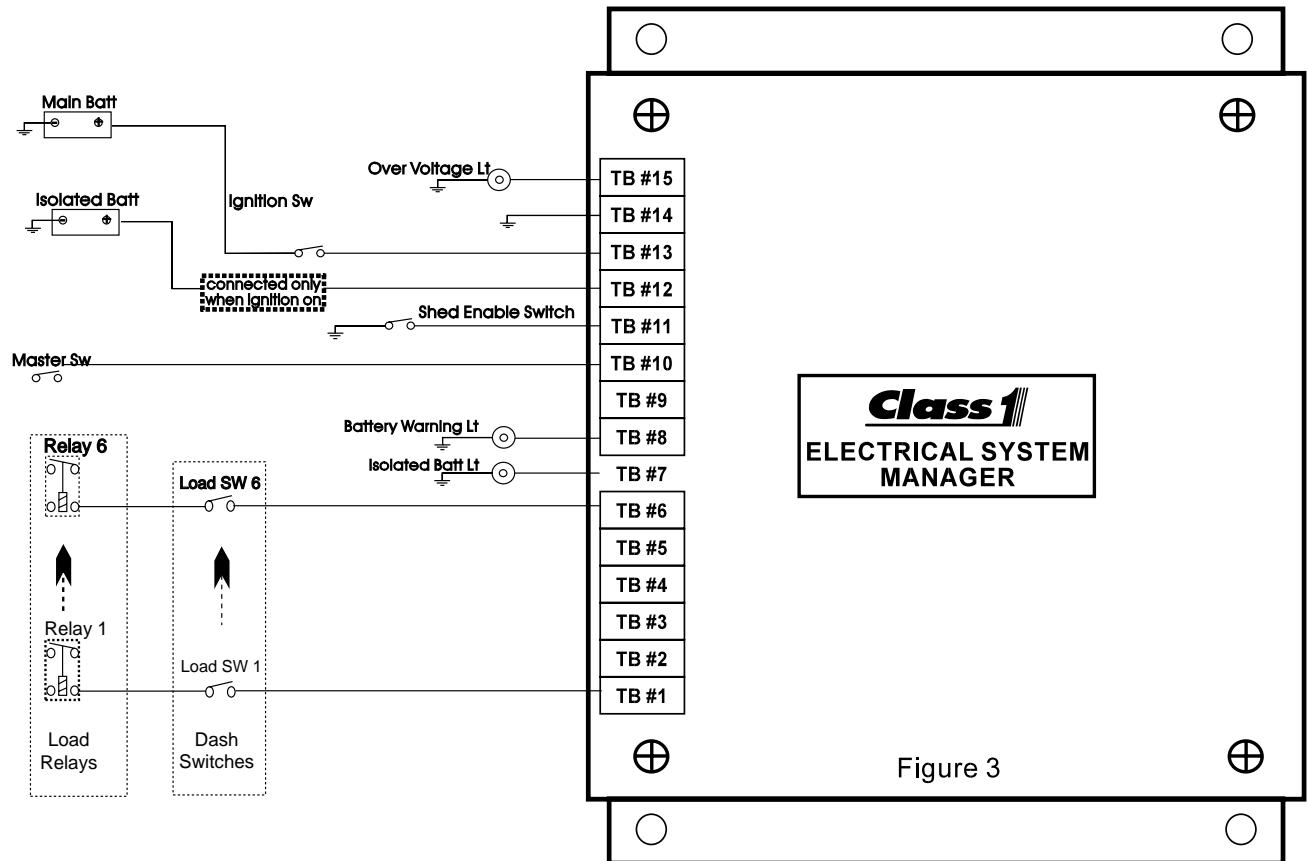
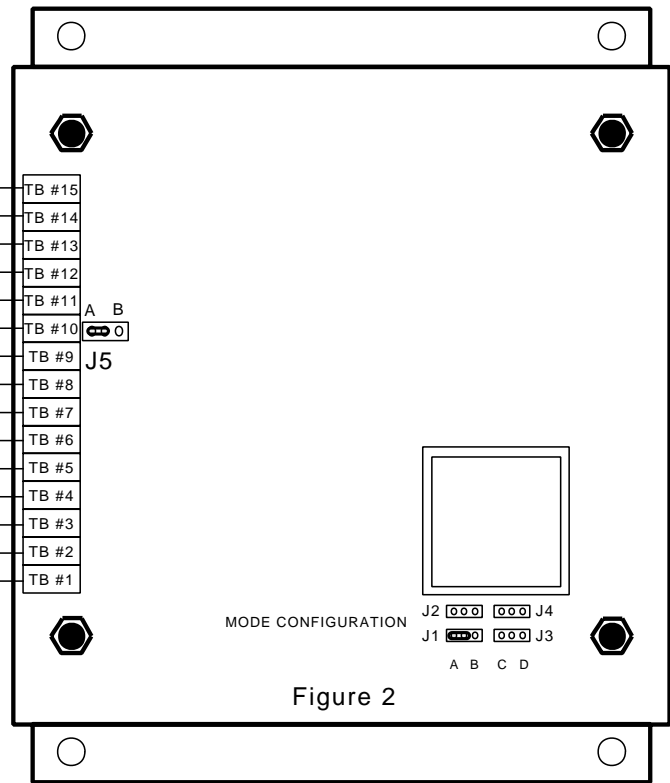
Figure1

# Main Battery Only Configuration

Jumper J1 and J5 are placed in pos. A.

This provides for seven load control outputs that can be sequenced and shed. These outputs are at terminals #1 through #7. The complete terminal descriptions for this mode are shown in Figure 2, and one method of wiring is shown in Figure 3.

- Over Voltage Lgt/ High Idle Control — TB #15
- Ground — TB #14
- Ignition — TB #13
- No Connection — TB #12
- Shed Enable — TB #11
- Master Switch — TB #10
- System Override — TB #9
- Battery Warning Lt — TB #8
- Load Level 7 — TB #7
- Load Level 6 — TB #6
- Load Level 5 — TB #5
- Load Level 4 — TB #4
- Load Level 3 — TB #3
- Load Level 2 — TB #2
- Load Level 1 — TB #1



# MAIN AND ISOLATED BATTERY CONFIGURATION

Jumper J1 and J5 are placed in position B.

The system manager will operate in main and isolated battery mode. This provides for six load control outputs which can be sequenced and shed. A separate input for the isolated battery is located at TB#12 and an output for low isolated battery is located at TB #7. One method of wiring is shown in Figure 5.

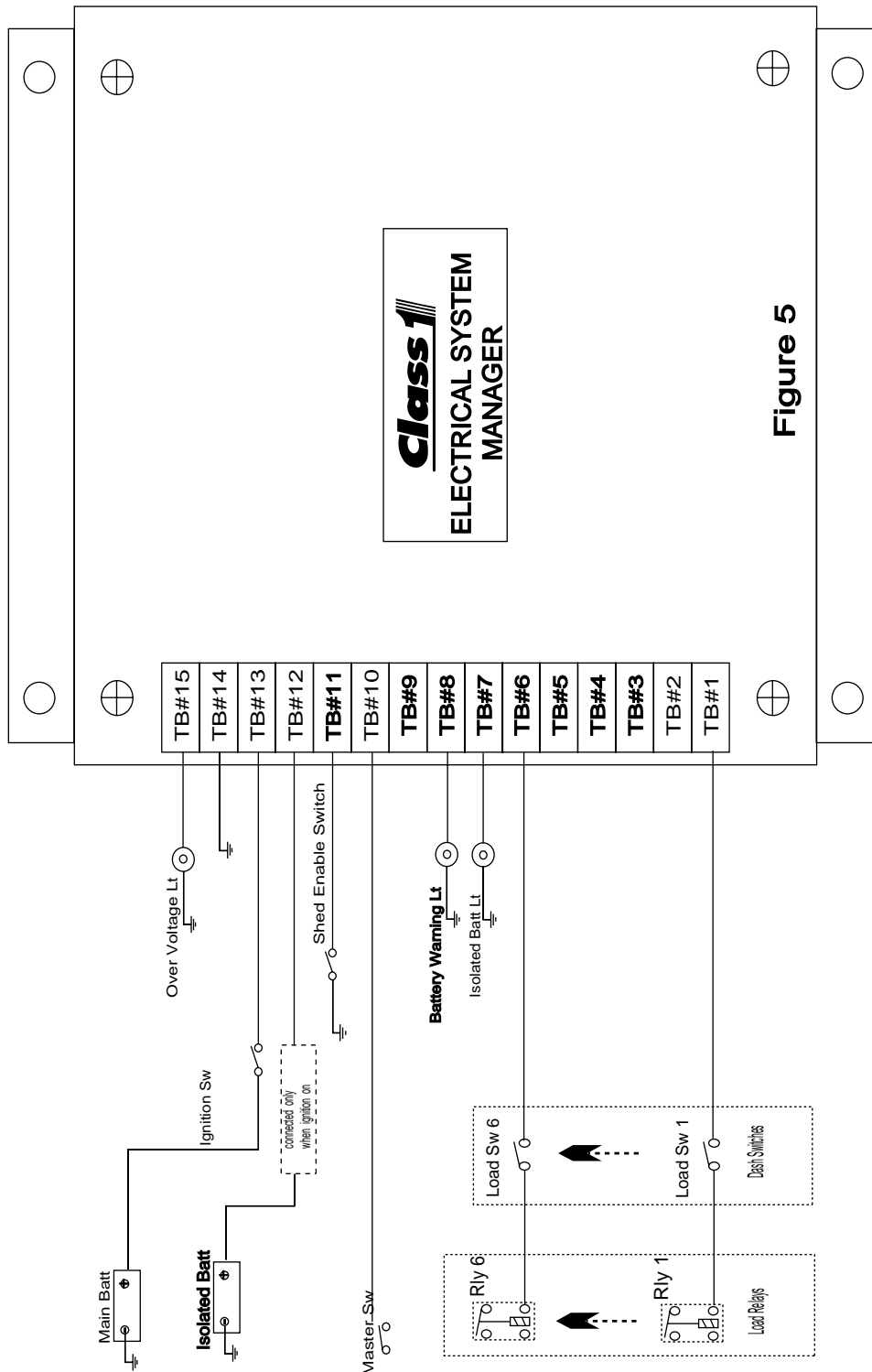


Figure 5

**Class 1**  
ELECTRICAL SYSTEM  
MANAGER

# Electrical System Manager II

The Electrical System Manager II is equipped with 8 Printed Circuit Board Relays mounted in an enclosure with the load manager. The relay coil input tab should be grounded for normal installations. The common and output tabs on each relay readily allow for custom installations.

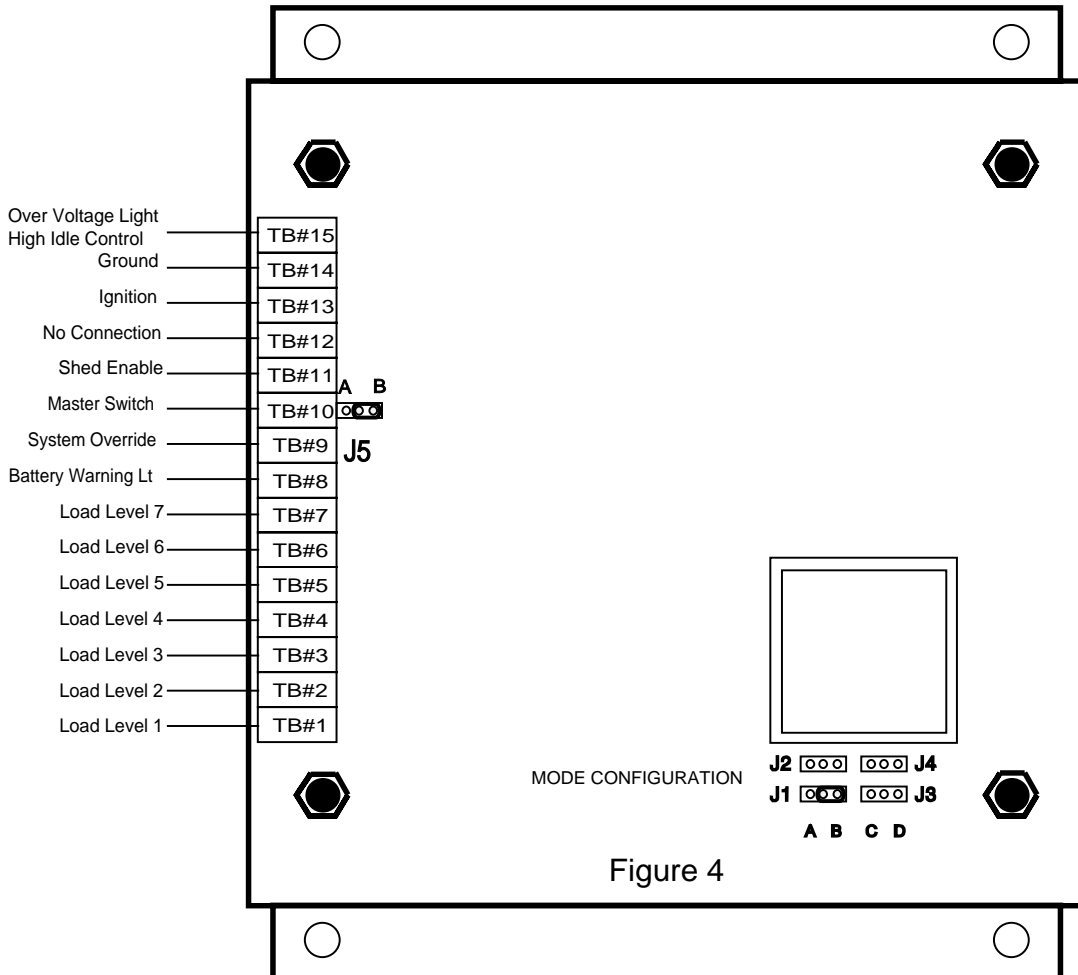
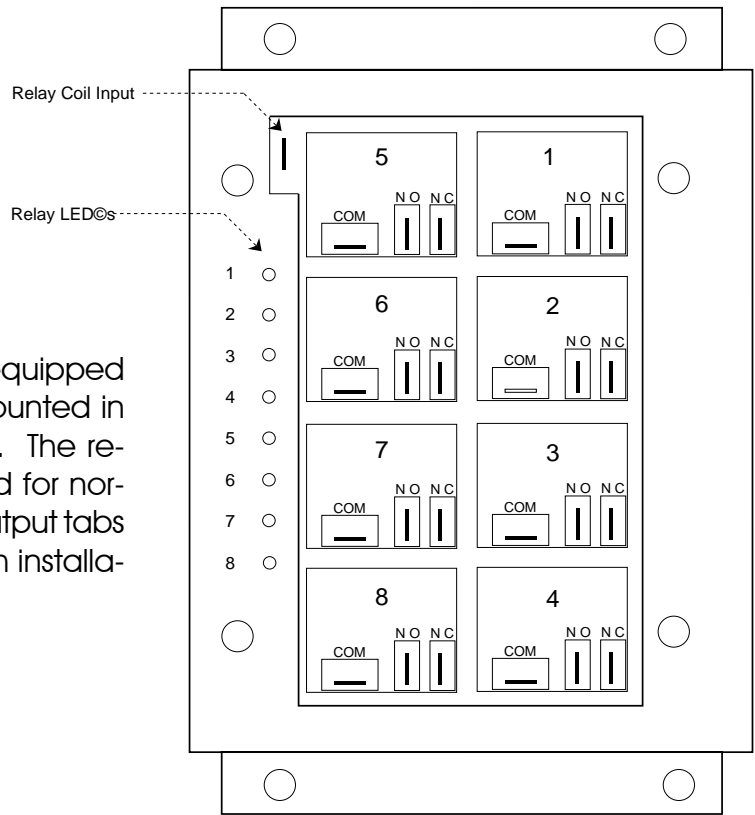
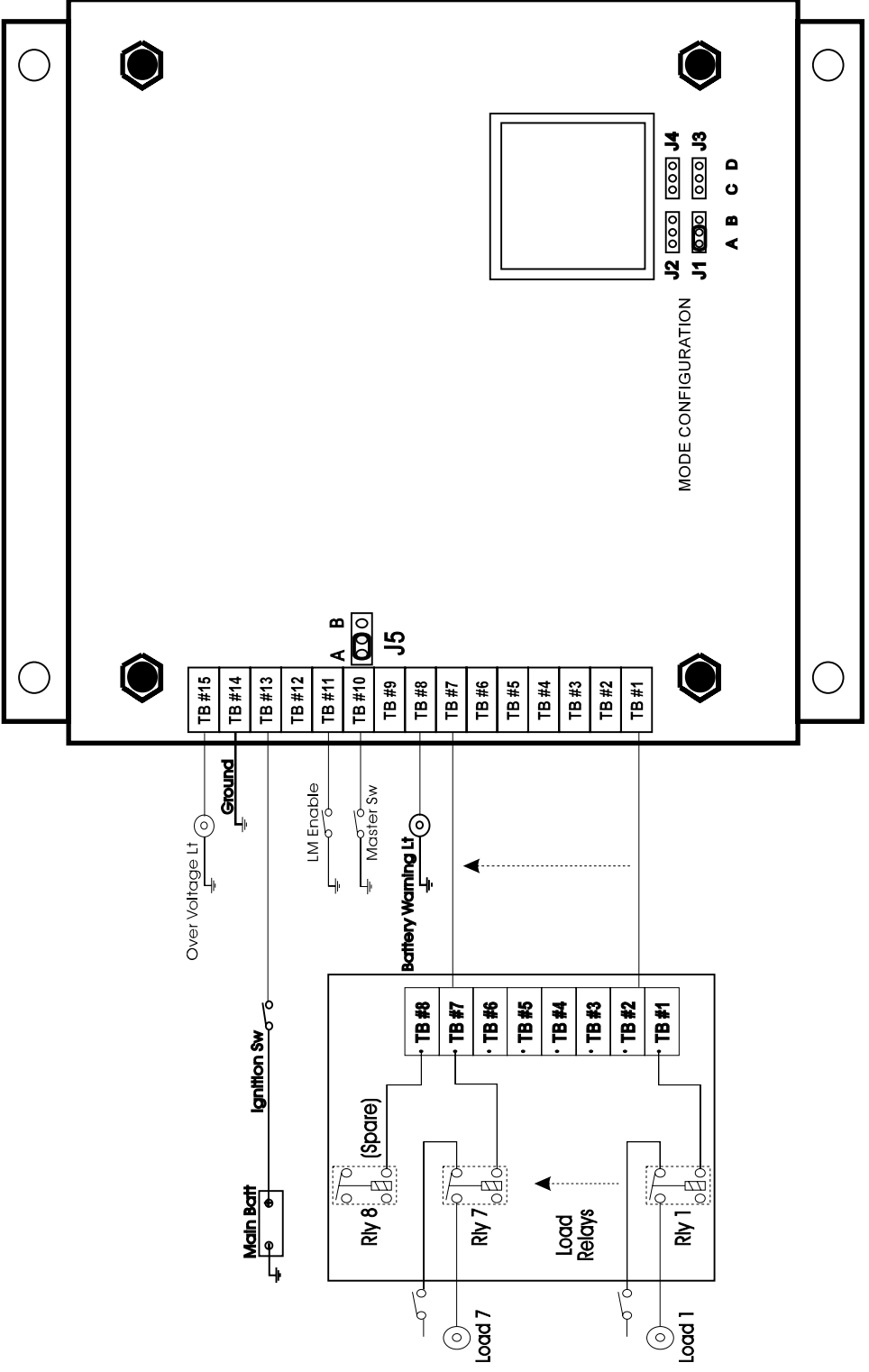


Figure 4

# Electrical System Manager II





# Terminal Block I/O Polarity

## Negative Master Switch and Positive Output PN 100633 ESM / PN 100756 ESM II

TB #15	+ Output	Overvoltage light or Fast idle control
TB #14	- Input	System Ground
TB #13	+ Input	Ignition (Main battery monitor voltage)
TB #12	+ Input	Isolated Battery monitor voltage
TB #11	- Input	Load Manage Enable (shed)
TB #10	- Input	Master Switch
TB # 9	+ Input	System Override
TB # 8	+ Output	Battery Low Warning Light
TB # 7	+ Output	Load 7 or isolated battery low light
TB # 6	+ Output	Load 6
TB # 5	+ Output	Load 5
TB # 4	+ Output	Load 4
TB # 3	+ Output	Load 3
TB # 2	+ Output	Load 2
TB # 1	+ Output	Load 1

## Positive Master Switch and Positive Output PN 100767 ESM / PN 101038 ESM II

NOTE: LOADS 1 & 2 DO NOT SHED, MAIN BATTERY MONITORING ONLY.  
LOADS SEQUENCE ON 1-7, SEQUENCE OFF 7-1 AND SHED 7-3.

TB #15	+ Output	Overvoltage light or Fast idle control
TB #14	- Input	System Ground
TB #13	+ Input	Ignition (Main battery monitor voltage)
TB #12	+ Input	Master Switch
TB #11	- Input	Load Manage Enable (shed)
TB #10	No Connection	
TB # 9	+ Input	System Override
TB # 8	+ Output	Battery Low Warning Light
TB # 7	+ Output	Load 7
TB # 6	+ Output	Load 6
TB # 5	+ Output	Load 5
TB # 4	+ Output	Load 4
TB # 3	+ Output	Load 3
TB # 2	+ Output	Load 2
TB # 1	+ Output	Load 1

# Terminal Block I/O Polarity

## Negative Master Switch and Ground Output PN 101084 ESM

TB #15	+ Output	Overvoltage Light or Fast Idle Control
TB #14	- Input	System Ground
TB #13	+ Input	Ignition (Main battery monitor voltage)
TB #12	+ Input	Isolated Battery monitor voltage
TB #11	- Input	Load Manage Enable (shed)
TB #10	- Input	Master Switch
TB # 9	- Input	System Override
TB # 8	- Output	Battery Low Warning Light
TB # 7	- Output	Load 7 or isolated battery low light
TB # 6	- Output	Load 6
TB # 5	- Output	Load 5
TB # 4	- Output	Load 4
TB # 3	- Output	Load 3
TB # 2	- Output	Load 2
TB # 1	- Output	Load 1

## Positive Master Switch and Ground Output PN 101119 ESM

NOTE: LOADS 1 & 2 DO NOT SHED, MAIN BATTERY MONITORING ONLY.  
LOADS SEQUENCE ON 1-7, SEQUENCE OFF 7-1 AND SHED 7-3.

TB #15	+ Output	Overvoltage light or Fast idle control
TB #14	- Input	System Ground
TB #13	+ Input	Ignition (Main battery monitor voltage)
TB #12	+ Input	Master Switch
TB #11	- Input	Load Manage Enable (shed)
TB #10	No Connection	
TB # 9	- Input	System Override
TB # 8	+ Output	Battery Low Warning Light
TB # 7	- Output	Load 7
TB # 6	- Output	Load 6
TB # 5	- Output	Load 5
TB # 4	- Output	Load 4
TB # 3	- Output	Load 3
TB # 2	- Output	Load 2
TB # 1	- Output	Load 1

# SPECIFICATIONS

## OPERATING VOLTAGE

7.5 to 20 Volts DC

## OUTPUTS

High Side Drivers      Vmain @ 0.5 amp (source)  
Low Side Drivers      Ground @ 0.5 amp (sink)

## ISOLATED BATTERY INPUT

0 to 20 Volts DC

## TRANSIENT SUPPRESSION

Outputs are protected against thermal overload, direct shorts and transient spikes from -50 to 60 Volts DC.

## LOAD CONTROL

Loads will be cycled on whenever the Master Switch is activated. The System Manager will control loads and the high idle function only when the Shed Enable input (terminal #11) is active.

Loads are shed from lowest priority to highest priority, level 1 to level 7, except for units with a positive master switch, they shed level 7 to level 3.

The voltage points are respectively:

L1-12.2, L2-11.95, L3-11.70, L4-11.45, L5-11.25, L6-11.10 and L7-10.95 VDC. Voltage must drop below the shed point for 30 seconds for a load to shed and voltage must be above the shed point for 60 seconds for a shed load to unshed.

NOTE:      The unit can be configured so that the loads can be turned on only by a manual reset.      *No automatic recycling*

## MANUAL LOAD RESET

Toggling the Master Switch off and then on again within 2 seconds manually resets the loads. Loads that were shed off will be cycled on and the high idle control will be reset. The System Manager will disable itself for 15 minutes.

## MANUAL FULL RESET

Toggling the Master Switch off for more than 2 seconds will cycle all loads off. The system will return to normal operation when the Master Switch is toggled back to the on position.

NOTE:      A signal applied to terminal #9 (system override) will force all loads ON, completely bypassing all load control functions of the unit.

# SPECIFICATIONS

## **TERMINAL BLOCK #15**

This output becomes active for the overvoltage light (high voltage) or for high idle control (low voltage) dependent on the setting of jumper J4.

## **OVER-VOLTAGE INDICATOR**

Activates at 14.5 VDC and deactivates at 14.0 VDC.

## **HIGH IDLE CONTROL**

The output will activate when the voltage drops below 12.3 VDC for more than 1 minute. The output will remain ON for a minimum of 5 minutes *and* until the voltage exceeds 13.0 VDC.

**NOTE:** This output must only be used in conjunction with the appropriate safety interlocks for the intended application.

## **AUXILIARY BATTERY**

When an auxiliary battery is present and the system is configured for it, The System Manager will monitor the auxiliary battery. Output (TB #7) is turned on when the battery voltage drops below 11.8 VDC for more than 2 minutes. The output will remain on for a minimum of 5 minutes and until the isolated battery voltage is greater than 12.5 VDC. If the main battery bank voltage exceeds 13 VDC, the output will deactivate and the system will then recheck the isolated battery voltage after a short delay. This allows the system to become part of a battery separation solenoid system.

**NOTE:** When configured to monitor a second battery source, only 6 loads can be controlled as output #7 is utilized for the isolated battery indicator. All other functions are unchanged.

## **BATTERY LOW WARNING LIGHT**

Output from TB #8 is disabled when the monitored voltage is above 13.2 VDC. Below this level, the output will flash to indicate a voltage drop. The output will flash at a varying rate proportional to the discharge rate of the battery. If the system detects a large instantaneous voltage drop, the light will flash rapidly for 3 seconds and then revert to its current flash rate.

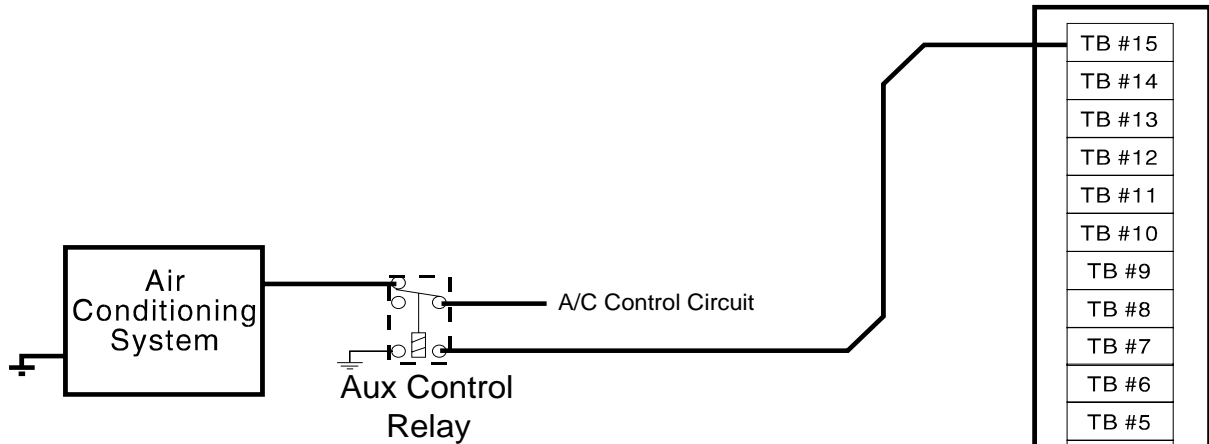
**NOTE:** The output will remain steady if any load has been controlled off *or* the system has been manually reset.

# MODELS AND FUNCTIONS

## Available System Managers and System Manager II's

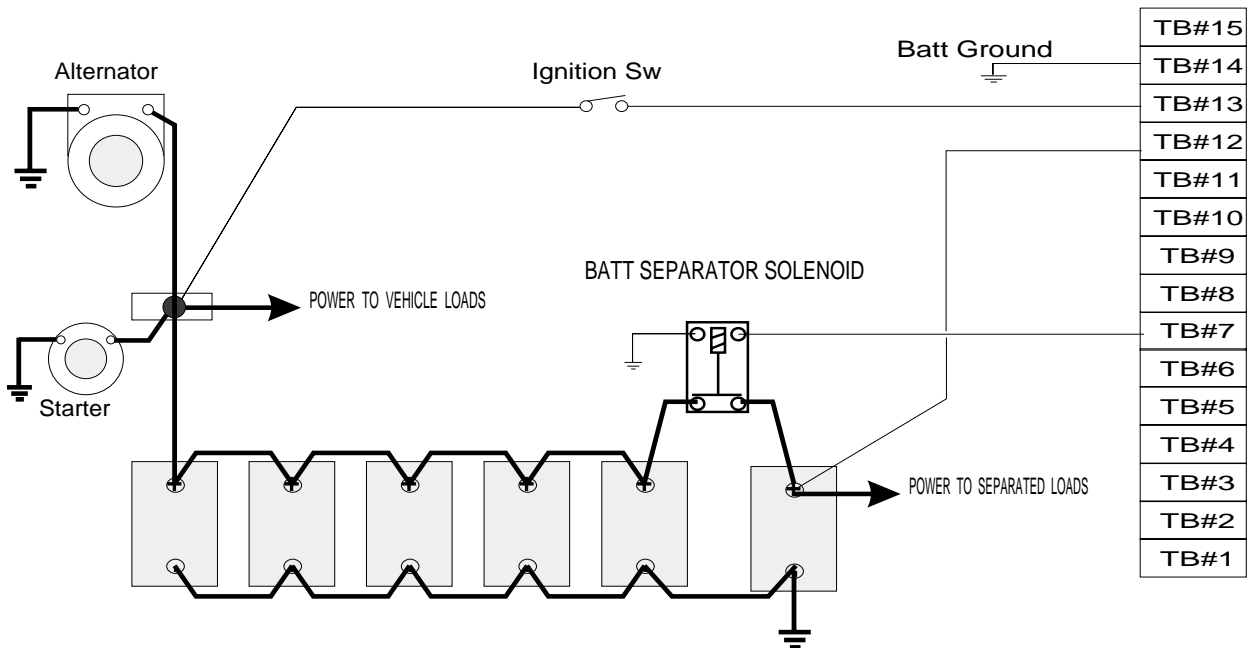
				1	1	1	1	1	1
				0	0	0	0	0	0
				0	0	1	0	1	1
				6	7	0	7	0	1
				3	5	8	6	3	1
				3	6	4	7	8	9
Terminal Block	Function	I/O	Polarity						
15	Overvoltage light	Output	Positive	X	X	X	X	X	X
	Fast idle control	Output	Positive	X	X	X	X	X	X
14	System Ground	Input	Ground	X	X	X	X	X	X
13	Ignition (main battery)	Input	Positive	X	X	X	X	X	X
12	Isolated battery	Input	Positive	X	X	X			
	Master Switch Shed Enable	Input	Positive				X	X	X
11	(Load Management)	Input	Ground	X	X	X	X	X	X
10	Master Switch	Input	Ground	X	X	X			
9	System Override	Input	Positive	X	X		X	X	
		Input	Ground			X			X
8	Battery Low Warning Light	Output	Positive	X	X	X	X	X	X
7	Isolated Battery Low	Output	Positive	X	X				
		Output	Ground			X			
7 - 1	Load 7 - Load 1	Output	Positive	X	X		X	X	
		Output	Ground			X			X

# SAMPLE CIRCUITS

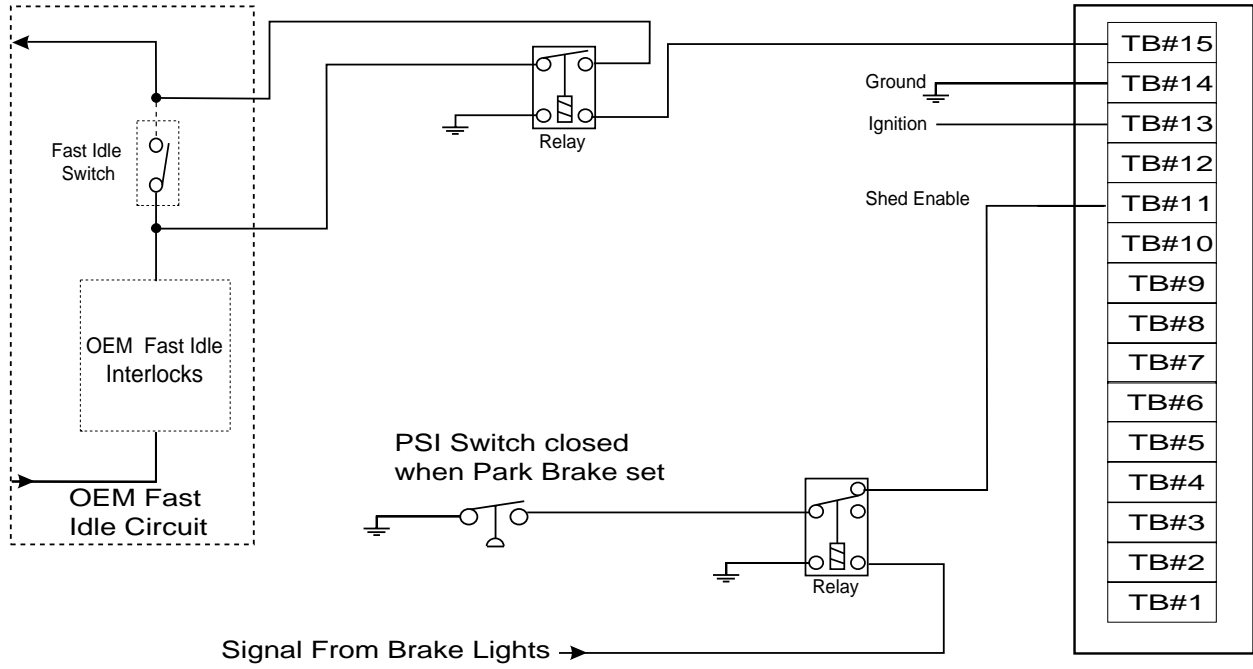


Note: As A/C control circuits vary by vehicle, the circuit shown is representative only of one method which can be utilized to interrupt the A/C control circuit. It is the responsibility of the installer to utilize properly rated relays or circuit breakers in the installation.

The loading on output #15 should not exceed 0.5 amps.



# SAMPLE CIRCUITS



Automatic FAST IDLE CIRCUIT, disabled when service brake is applied