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STANDARD FEATURES

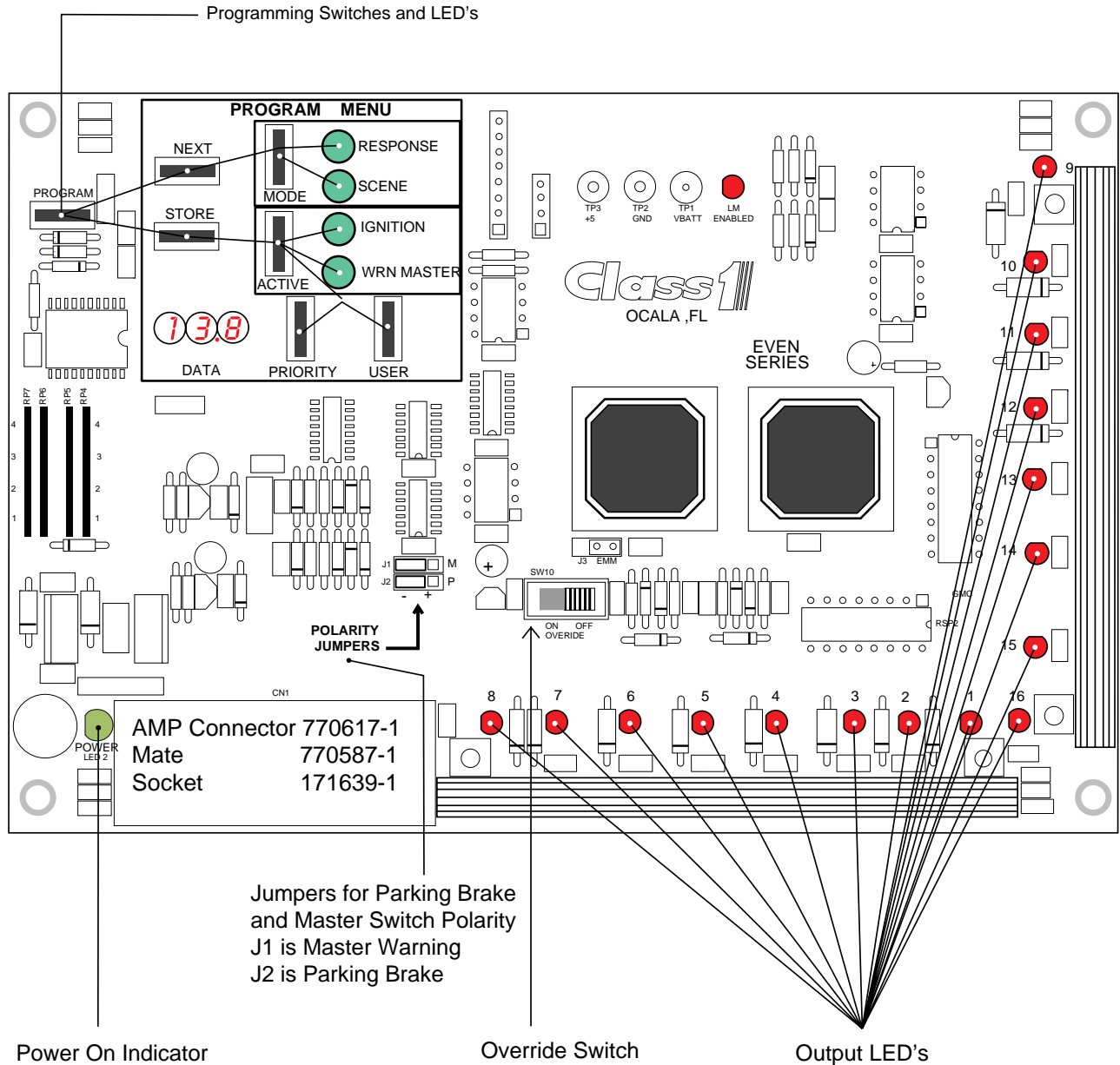
Class 1's Total System Manager provides a highly flexible electrical load management system that is user programmable for each output load.

- ☑ Main Battery Monitoring
- ☑ Auxiliary Battery Monitoring
- ☑ Electrical Load Shedding
- ☑ Electrical Load Sequencing
- ☑ Reverse Polarity / Short Circuit Protection
- ☑ Sixteen Available Outputs.
- ☑ Priorities can be set for Individual Loads.
- ☑ Each load can be tied to Response and/or Scene Mode.
- ☑ Individual loads can be configured to the Ignition or Master Warning Switch.
- ☑ Dedicated output for a Fast Idle Function.
- ☑ Low Voltage Alarm Output for Main Battery. (NFPA 1901)
- ☑ Low Voltage Alarm Output for Auxiliary Battery.
- ☑ Variable Trip 'User Selectable' Output.
 Selectable 10.5 to 15 VDC.
- ☑ Master Switch and Park Brake Switch can be either polarity
 (positive or ground.)
- ☑ Digital Display shows System Voltage in Normal Operation
- ☑ Digital Display shows Configuration Information while in Program Mode.
- ☑ Default Configuration can be restored at any time.
- ☑ Positive Outputs
- ☑ Ground Outputs

LAYOUT

Class 1

Total System Manager



adobelai4lepsdsm_int.eps

OPERATIONAL DATA

* SHED POINTS

Level 0	Never Shed
Level 1	11.0 Volts
Level 2	11.4 Volts
Level 3	11.8 Volts
Level 4	12.0 Volts
Level 5	12.2 Volts
Level 6	12.4 Volts
Level 7	12.6 Volts
Level 8	12.7 Volts

* UNSHED POINTS

Level 1	11.4 Volts
Level 2	11.6 Volts
Level 3	12.0 Volts
Level 4	12.2 Volts
Level 5	12.4 Volts
Level 6	12.6 Volts
Level 7	12.8 Volts
Level 8	13.0 Volts

SEQUENCING

Electrical loads will turn on sequentially in priority order from 1 to 8 when their respective switch is activated (either ignition or warning master) and the vehicle is operated in the mode selected for that output (response and/or scene.) Loads will sequence off in reverse order. Priority zero loads will be sequenced on and off but will not shed.

SHEDDING

Electrical loads will be turned off (shed) when the system voltage drops to the shed point for a minimum of 1 minute (this prevents load shedding due to momentary system power loading such as high current start-up devices.) Once shed, loads will remain off for a minimum of 5 minutes *and* until the unshed voltage is achieved for a minimum of 1 minute. Loads will only shed if the Parking Brake is set and the Load Manage Enable input is "grounded"

- * **NOTE:** **SHED POINT** is the voltage that will cause a load to be turned off if the system voltage drops to this point.
UNSHED POINT is the voltage that must be achieved before a load is turned back on once it has been shed.

FAST IDLE

A fast idle output is activated whenever the system voltage is reduced to 12.8 VDC for at least one minute.

The fast idle output will remain ON for a minimum of 10 minutes *and* until 13.0 VDC is achieved.

The fast idle output is dependent on the Parking Brake and Load Manage Enable Inputs.

NOTE 1: This output should only be used as part of a fast idle control system when the proper safety interlocks are present.

NOTE 2: The FAST IDLE output will turn off immediately when the Load Manage Enable Input is removed from ground potential.

LOW VOLTAGE ALARM

Whenever the system voltage drops below 11.9 VDC a low voltage alarm output (ground) is activated.

This complies with the N.F.P.A. 1901 requirements.

OPERATIONAL DATA

SWITCH SOURCES

Ignition

Loads will sequence on when the vehicle ignition switch is turned ON.

Warning Master

Loads will sequence on when the master warning switch is turned ON.

EACH LOAD CAN BE PROGRAMMED FOR
ACTIVATION BY EITHER SOURCE

USER SETPOINT/VARIABLE TRIP

This is the user definable output. The user has the option of selecting a 'trip' voltage between 10.5 and 15.0 VDC. If the trip point is set to 13.8 V or above, the output acts as an overvoltage indicator and will 'energize' when the selected voltage is reached. If the 'trip' point is set below 13.8 VDC, then the output will 'energize' when the voltage drops to the setpoint.

AUXILIARY BATTERY MONITORING

Terminal #23 can be used to monitor an auxiliary battery. There should be no connection to this terminal if a remote battery is not monitored. If the auxiliary battery voltage drops below 11.9 volts, it will activate the auxiliary battery low output.

OUTPUT MODES

Response Mode

Output is ON only when the Park Brake is **NOT** set.

Scene Mode

Output is ON only when the Park Brake **IS** set.

Both

Output is ON in both Response and Scene Mode.

EACH LOAD CAN BE PROGRAMMED FOR
RESPONSE MODE, SCENE MODE, OR BOTH.

OPERATING VOLTAGE

7.5 to 20 Volts D.C.

OUTPUTS

High Side Drivers Vmain at 0.5 amp.
(source)
Low Side Driver Ground at 0.5 amp.
(sink)

TRANSIENT SUPPRESSION

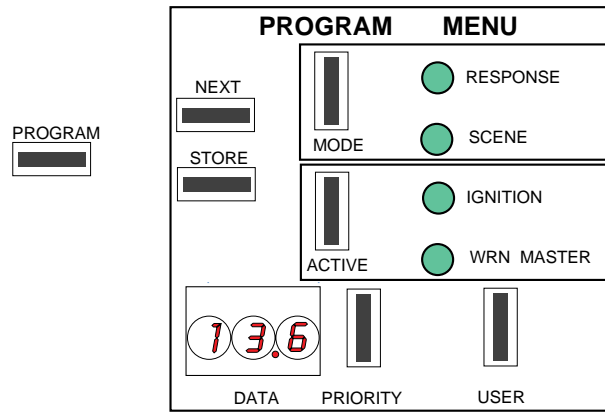
Outputs are protected against thermal overload, direct shorts and transient spikes from -50 to +60 volts D.C.

OVERRIDE

Outputs 1 through 12 are forced on when the override switch is active.

Twelve (12) outputs can be programmed by the user to be activated by the Ignition or Master Switch, tied to Scene Mode, Response Mode or Both, and assigned a Specific Priority Level. More than one output load can be set to the same Priority Level.

PROGRAMMING



Programming of the **Class 1** Total System Manager is accomplished using push-button switches and a straightforward menu approach. A digital display and 4 LED's provide feedback to the programmer.

PROGRAM SWITCH

This switch and the **USER** switch when held until the display shows three (3) dashes (---) puts the T.S.M. into the programming mode. When held until (**DEF**) is displayed (aprox. 15 seconds), the factory defaults are programmed into the system.

The final programming step is to hold the **PROGRAM** switch until (**Pro**) is displayed to save the new values.

PROGRAM MENU SWITCHES

NEXT SWITCH

Pressing this switch will cycle through each output, the LED next to each output will light when that output is selected and the digital display will also indicate the load selected (**L01-L13**).

PRIORITY SWITCH

This switch selects the sequence and shed priority level for the selected output. A small digital display shows the priorities (**P00-P08**) as they cycle through. Loads sequence on in 1-8 priority and shed off in 8-1 priority. Priority 0 loads never shed, but will sequence on and off.

ACTIVE SWITCH AND LED'S

This toggles the switch source for the selected output.

IGNITION LED Output is tied to the ignition switch.

WRN MASTER Output is tied to the master switch.

MODE SWITCH AND LED'S

The **MODE** switch toggles through the available modes for load management.

RESPONSE LED Output is ON only when the parking brake is NOT set.

SCENE LED Output is ON only when the parking brake is set.

BOTH LED'S The output can be ON regardless of the parking brake status.

USER

This adjusts the setpoint voltage for output #13 (term. 19).

Pressing this button increases the 'trip' point in 0.1 volt increments from 10.5 VDC to 15.0 VDC.

NOTE: If the setpoint is 13.8 volts or higher, output #13 will activate when the system voltage rises to the setpoint. If the setpoint is less than 13.8 volts, output #13 will activate when the voltage falls to the setpoint.

STORE SWITCH

The **STORE** switch saves the current configuration for the selected output. The display will indicate that the values were saved by showing three (3) dashes (---) and then the load number (**Lxx**).

PROGRAMMING

Programming Example:

You want load #3 to shed at a voltage level of 12.0 VDC, be tied to the Master Switch, and be active in the Scene Mode.

Depress the **USER** and **PROGRAM** switches until (- - -) is displayed.

Press the **NEXT** switch until the desired load LED is lit and the load that you want to change is displayed.

When **L03** is displayed, load #3 is ready to be programmed.

Press the **MODE** switch until the appropriate LED('s) are lit for the configuration you desire.

When the **SCENE** LED is lit, the load will be active when the parking brake is set.

Press the **ACTIVE** switch to toggle between the **IGNITION** and **WRN MASTER** LED's.

When the **WRN MASTER** LED is lit, the load will sequence on when the Master Warning switch is turned on.

Press the **PRIORITY** switch to cycle through the priority levels P00 through P08 until the desired priority is displayed.

When **P04** is displayed, the load will shed when the system voltage drops to 12.0 VDC.

Check the display to ensure that the load is configured to your requirements.

Mode LED's	RESPONSE	OFF
	SCENE	ON

Active LED's	IGNITION	OFF
	WRN MASTER	ON

Data Display **P04**

If everything is correct, depress the **STORE** switch until the display blanks out momentarily. This saves the configuration for the load you just programmed.

If you wish to change another load, press **NEXT** until that load is displayed and repeat the programming process for that load.

When all loads are programmed to your requirements, depress the **PROGRAM** switch until (**Pro**) is displayed to preserve all the configurations.

If you do not depress the **PROGRAM** switch and power to the unit is removed, no changes are made to the configuration.

If you want to return the Total System Manager to it's default settings, depress the **PROGRAM** switch until (**dEF**) is displayed, approximately fifteen (15) seconds.

*IF YOU DO NOT PRESS THE **STORE** SWITCH AFTER EACH OUTPUT IS CONFIGURED,
THAT OUTPUT WILL NOT BE CHANGED.
AFTER COMPLETING YOUR PROGRAMMING, PRESS **PROGRAM** TO SAVE ALL INFORMATION!*

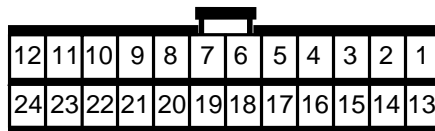
CONNECTIONS

Terminal Function and Polarity

<u>TERMINAL</u>	<u>FUNCTION</u>	<u>POLARITY</u>	<u>TERMINAL</u>	<u>FUNCTION</u>	<u>POLARITY</u>
1	Load Manager Enable	Ground	13	Output Load # 1	Pos/Gnd
2	Output Load # 2	Pos/Gnd	14	Output Load # 3	Pos/Gnd
3	Output Load # 4	Pos/Gnd	15	Output Load # 5	Pos/Gnd
4	Output Load # 6	Pos/Gnd	16	Output Load # 7	Pos/Gnd
5	Output Load # 8	Pos/Gnd	17	Output Load # 9	Pos/Gnd
6	Output Load #10	Pos/Gnd	18	Output Load # 11	Pos/Gnd
7	Output Load #12	Pos/Gnd	19	Output Variable Trip	Positive
8	Auxiliary Battery Alarm	Positive	20	Output Fast Idle	Positive
9	Low Voltage Alarm	Ground	21	Parking Brake	Either
10	Master Switch	Either	22	No Connection	-----
11	No Connection	-----	23	Input Aux. Battery	Positive
12	Main Battery Voltage	Positive	24	Ground	Ground

The polarity of Loads 1-12 are unit dependent.

JUMPERS J1 AND J2 MUST BE SET TO MATCH THE POLARITY OF THE PARKING BRAKE AND MASTER SWITCH INPUTS.



Mating Connector viewed from wire insertion end

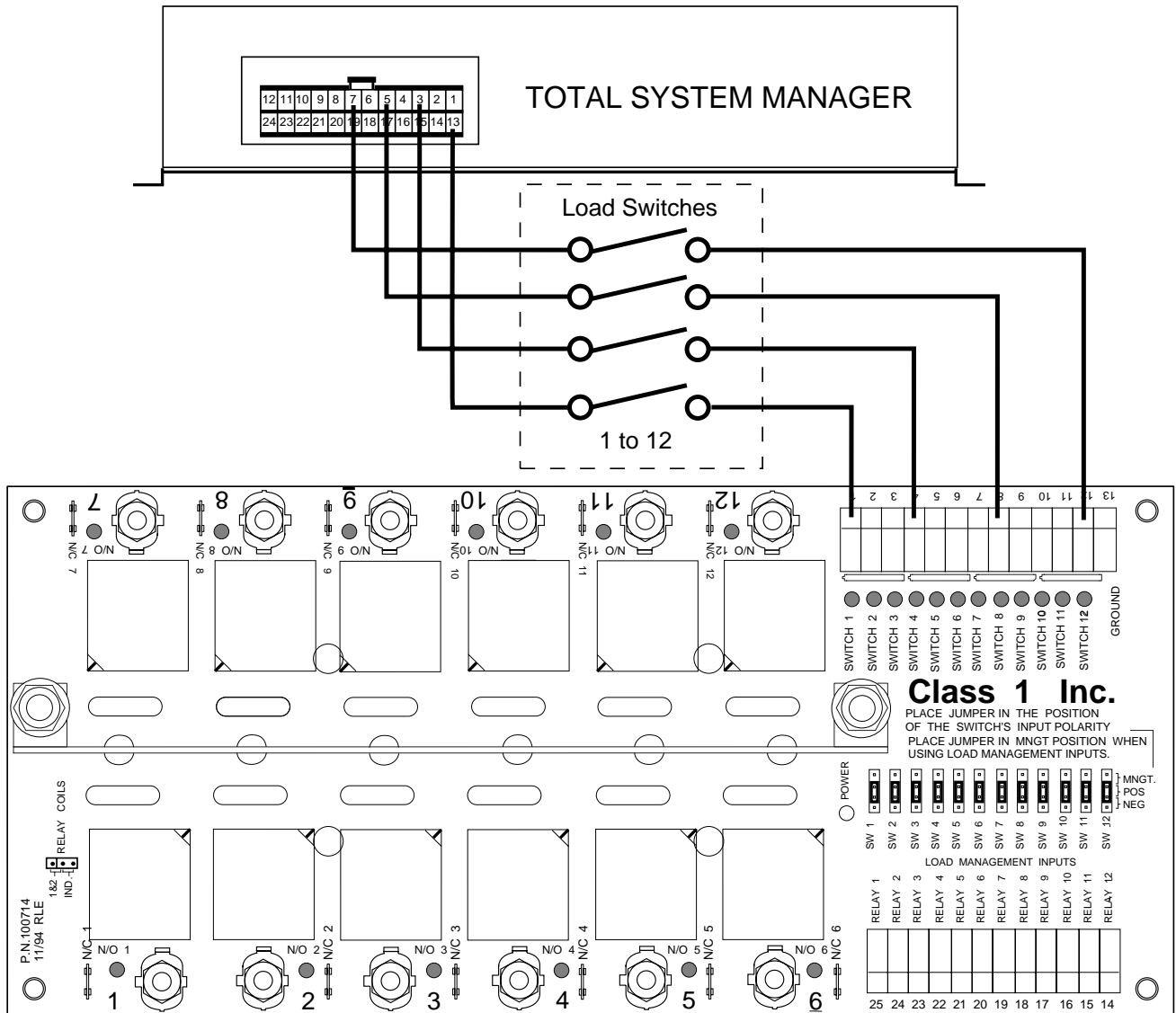
1	LM enable	13	Load 1
2	Load 2	14	Load 3
3	Load 4	15	Load 5
4	Load 6	16	Load 7
5	Load 8	17	Load 9
6	Load 10	18	Load 11
7	Load 12	19	Var Trip
8	Aux Batt Alarm	20	Fast Idle
9	Alarm	21	Park Brake
10	Master SW	22	NC
11	NC	23	Aux Batt IN
12	Batt +	24	Ground

Mating Connector	AMP 770587-1	
Socket (Loose Form)	AMP 171639-1	16-18 Ga
Socket (Strip Form)	AMP 171637-1	16-18 Ga
Crimping Tool	AMP 90760-1	Pro-Crimper
Contact Extraction Tool	AMP 189727-1	
Connector and Socket Kit	P.N. 101536	
Mating Pigtail	P.N. 101538	

THE BATTERY PLUS (TERM. #12) AND GROUND (TERM. #24) SHOULD BE WIRED AS DIRECT TO THE BATTERY AS POSSIBLE. These are the connections that the Total System Manager uses to derive it's voltage information.

CONNECTIONS

Connections to the vehicle electrical system can be simplified by using the **Class 1** 12 relay board. Simply install the cab load switches in series between the Total System Manager and the 12 relay board switch inputs. This installation allows the dash switches to illuminate only when a load is enabled, giving the operator a quick check of the vehicle's electrical system ready status.

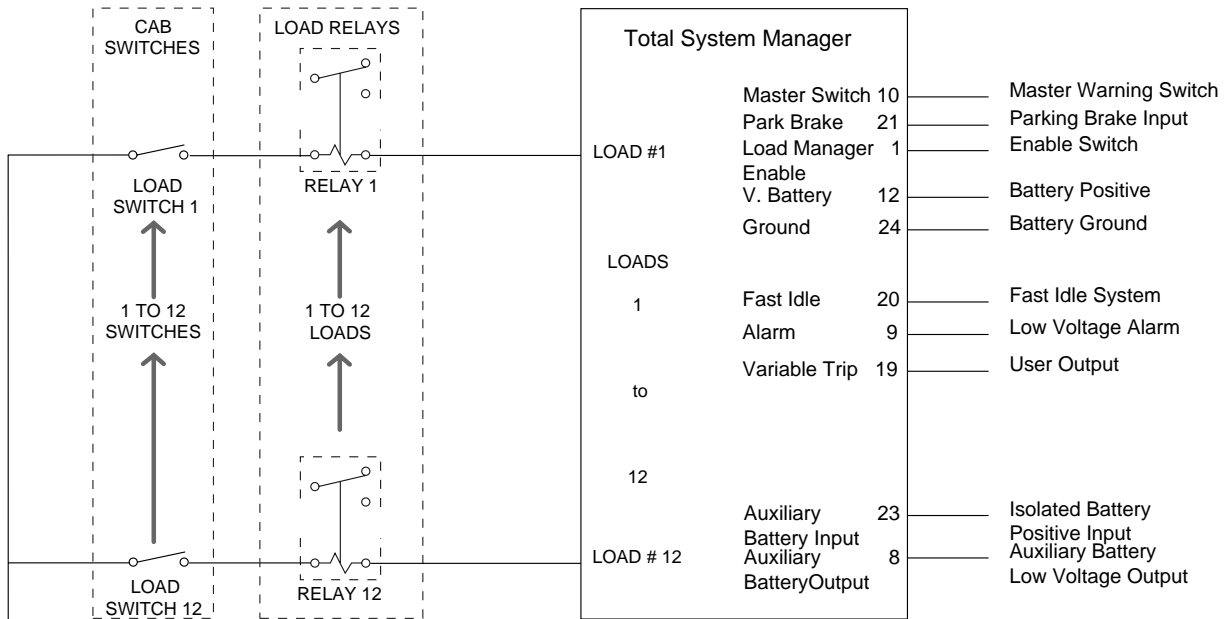


12 RELAY BOARD

NO Connection

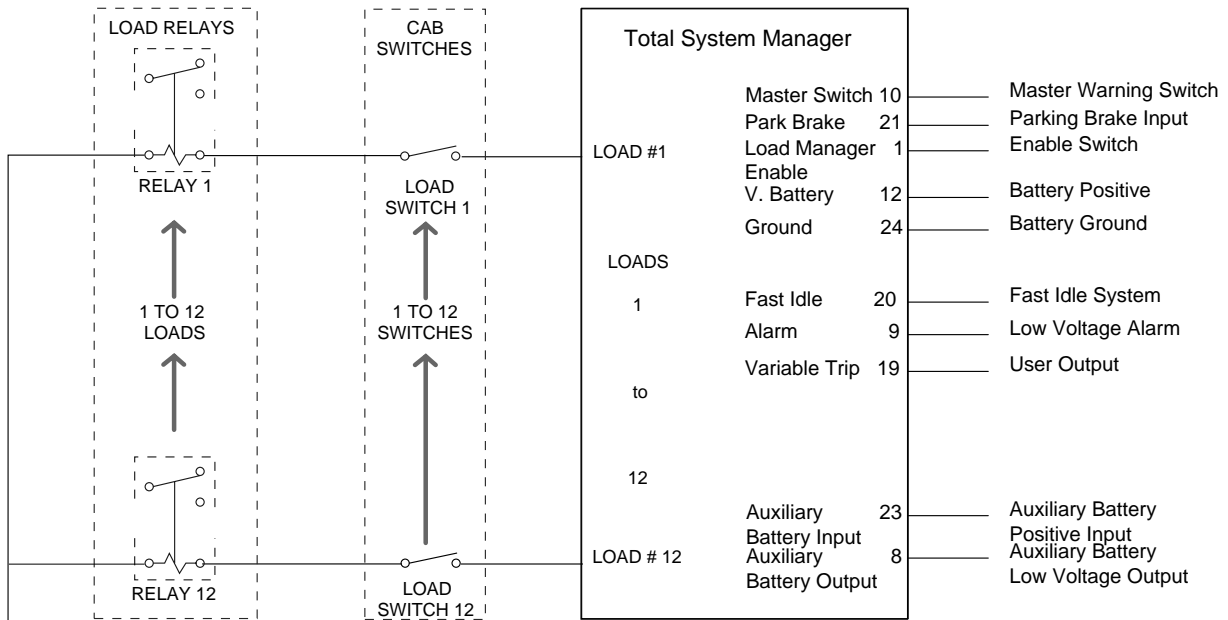
Set Jumpers
POSITIVE or
NEGATIVE to
match T.S.M.
Outputs.

CONNECTIONS



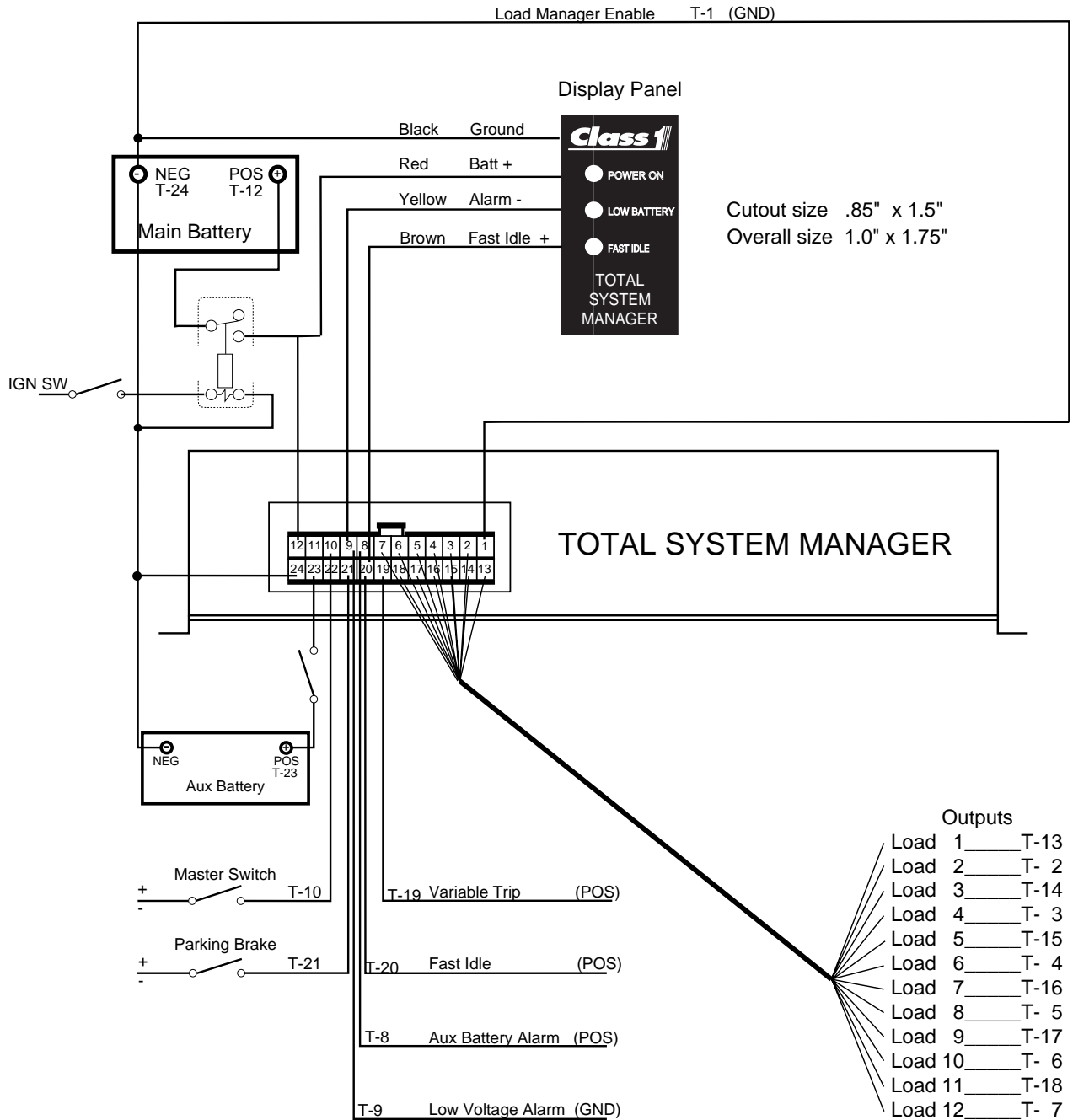
Positive or Negative
dependent on T.S.M.

Two methods for interfacing the **Class 1** Total System Manager into a vehicle's electrical system. The TSM outputs are designed to drive relays to control the loads, so a wide variety of installations can be made.



Positive or Negative
dependent on T.S.M.

CONNECTIONS



DEFAULT SETTINGS

The **Class 1** Total System Manager is shipped with the following default settings.

<u>PRIORITY</u>	<u>SHED POINT</u>	<u>UNSHED POINT</u>
8	12.7	13.0
7	12.6	12.8
6	12.4	12.6
5	12.2	12.4
4	12.0	12.2
3	11.8	12.0
2	11.4	11.6
1	11.0	11.4

Loads 1 through 8 are set to priority 1 through 8 respectively and are tied to the Master Warning Switch.

These loads will sequence on 1 through 8 and sequence off 8 through 1. They will shed 8 through 1 when the system voltage falls to the shed point for that priority level.

Loads 9 through 12 are set to priority zero and come on with the ignition switch.

These loads will sequence on and off but will not shed due to low voltage.

Loads 1 through 12 are configured to BOTH modes, scene and response.

Load #13 is the User Configurable Output.

The default setting for this 'Variable Trip' Point is 14.5 VDC.

Load #14 is the AUXILIARY Battery Alarm.

Load #15 is the Fast Idle Output.

This load becomes active when the system voltage drops to 12.8 VDC.

Load #16 is the Low Voltage Alarm Output.

This load becomes active when the system voltage drops below 11.9 VDC.

Parking Brake and Master Switch Input Jumpers are set to ground (-).

*The factory default settings can be reprogrammed into the system by pressing and holding the **USER** and **PRG** switches for fifteen (15) seconds, (dEF) will be shown on the display panel when the defaults have been reprogrammed.*

NOTE: On some units the user switch is labeled var trip!