LOAD MANAGER 1901

Model 091-86-1901

An Electrical System Controller To Provide

Load Sequencing, Load Shedding, High Idle

Engine Control and Low and High Voltage

Monitoring To Meet The Requirements of

NFPA 1901

5/11/1998

SINCE 1967, DESIGNERS OF INNOVATIVE PRODUCTS
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INTRODUCTION:

The Load Manager 1901 is an 8 channel sequencer and load manager designed to incorporate all of the requirements of NFPA 1901. In addition, other features not required by NFPA 1901 have been included since they have been popular in other load managers. The following is a list of the features provided.

a. Sequential operation of 8 electrical loads

b. Load manage 8 electrical loads in two groups of four.

Load manage loads 1R through 4R in the "enroute" mode

Load manage loads 1S through 4S in the "at scene" mode

c. Load manage 1 load, not sequenced, which is shed prior to shedding the sequenced loads. This may be used for an air conditioner.

d. Low voltage alarm with 2 minute delay as required by NFPA 1901

e. High voltage alarm

f. High idle output to increase engine speed at idle

g. A timer on the high idle output provides a minimum time for high idle operation to eliminate cycling

h. A provision for disabling the Load Manager from one of the sequenced loads

OPERATION:

The Load Manager 1901 is supplied with a 4 LED display to indicate the status of the electrical system to the operator. Outputs from the load manager operate relays in the vehicle by grounding one side of the relay coil. The relays which are not supplied with the load manager carry the high currents. When a +12 volt signal is applied to pin J1-3 the relays connected to pins J2-1 through J2-8 are sequentially energized at approximately 1/2 second intervals. Removing the +12 volts from J1-3 sequences the relays "OFF". The power to operate the Load Manager is obtained from J1-1 while the ground is at J1-2. It is very important to have J1-1 connected to a solid source of +12 volts and a good ground on J1-2. It is preferable to run a wire directly from J1-2 to the battery negative to insure that ground circuit currents do not erroneously signal the Load Manager. As the Load Manager senses the battery condition from the voltage at J1-1 it is preferable to connect this point by a single wire to the output of the vehicles master switch or that point at which the battery voltage is to be sensed..

NOTE

Any change in voltage detected at pins J1-1 to J1-2 will be sensed as a change in battery voltage and will cause the Load Manager to shed loads.

Applying +12 volts to J1-4 enables the Load Manager. In some installations this may be permanently connected to +12 volts. If wired permanently the Load Manager will continuously monitor the battery voltage and shed loads as required.

A Safety Interlock, either a "Neutral Safety Switch" or "Parking Brake" switch is connected to either J1-5 or J1-6. It is important to connect to only one of these inputs, not both. Two inputs performing the same function are provided. J1-5 is used when the signal is a connection to "ground" while J1-6 is used when the signal is +12 volts.

The Safety Interlock input performs several functions as follows:

a. Select the "Load Shed" mode. With the switch "OFF" the "Enroute" loads 1R through 4R are shed. With the switch "ON" the "At the Scene" loads 1S through 4S are shed.

b. Enables the High Idle circuits. When the Load Manager detects low voltage and Safety Interlock input is present, then a High Idle output is generated. Removal of the Safety Interlock input immediately disables the High Idle output.

A High Idle input is connected to J1-7. This permits the operator to select High Idle. An output from the High Idle (pin J2-11) is obtained only when:

a. High Idle input is selected
b. Load Manager is enabled
c. Safety interlock switch is closed
d. The battery voltage sensed is low (2 minutes after the voltage recovers the high idle will shut down)

In some installations it is desirable to have a load that is sequenced but not load managed. The Load Manager 1901 contains a switch that permits this. Figure 5 is a layout of the circuit board that shows the location of this switch, S-1. This switch is normally moved to the right, the OFF position. In that position 4 loads are shed in the "enroute mode" and 4 loads are shed in the "at the scene mode". Moving the switch to the left or ON position, reduces the shedding to 3 loads in each mode. The loads connected to pins 4 and 8 are not shed. Load on/off

sequencing is not affected. The S-1 Operation Table lists the switch positions and the channels controlled.

A High Voltage detector is provided to operate a relay whenever the sensed voltage exceeds 15 volts. This output is located at J2-10. As with all the outputs, relays with a coil resistance as low as 40 ohms can be operated.

A Load Manager output is provided at J2-12. A load connected at this point is not sequenced but is shed before shedding any of the sequenced loads. This makes it ideal for an Air Conditioner or other high current load.

SUMMARY OF PIN CONNECTIONS

J1-1	+12 volts, power and voltage sense +
J1-2	power ground and voltage sense -
J1-3	sequencer input, +12 volts sequences loads "ON", open circuit sequences loads "OFF"
J1-4	Load Manager enable, +12 volts turns on voltage sensing circuits, Load Manager sheds loads when low voltage is detected
J1-5	safety interlock (gnd), connection to ground signal Load Manager that vehicle is not moving
J1-6	safety interlock (pos), +12 volts signal Load Manager that vehicle is not moving
J1-7	high idle input, +12 volts signals Load Manager that high idle is desired
J1-8	no connection
J2-1	output to load relay #4S, grounds relay coil to operate
J2-2	output to load relay #3S. grounds relay coil to operate
J2-3	output to load relay #2S, grounds relay coil to operate
J2-4	output to load relay #1S, grounds relay coil to operate
J2-5	output to load relay #4R, grounds relay coil to operate
J2-6	output to load relay #3R, grounds relay coil to operate
J2-7	output to load relay #2R, grounds relay coil to operate
J2-8	output to load relay #1R, grounds relay coil to operate
J2-9	low voltage output, grounds relay coil when sensed voltage drops below 11.8 volts for 2 minutes
J2-10	high voltage output, grounds relay when sensed voltage exceeds 15.0 volts
J2-11	high idle output, grounds relay when high idle is selected, low voltage is sensed & interlock switch is closed
J2-12	load manager 1, grounds relay when NORMAL voltage is detected, this output is not sequenced, used to shed air conditioner or similar load, this output goes High to shut down air conditioner relay
J2-13	no connection
J2-14	no connection
J3-1	power to indicator
J3-2	load manager ON LED return
J3-3	high voltage LED return
J3-4	high idle LED return
J3-5	load manage LED return

SEQUENCER OPERATION TABLE

FUNCTION	RELAY	PIN NUMBER -J2
First to sequence ON	1R	8
Second to sequence ON	2R	7
Third to sequence ON	3R	6
Fourth to sequence ON	4R	5
Fifth to sequence ON	1S	4
Sixth to sequence ON	2S	3
Seventh to sequence ON	3S	2
Eighth to sequence ON	4S	1

LOAD SHED SEQUENCE

INTERLOCK SWITCH	RELAY	ORDER OF SHED
SCENE	1S	FIRST TO SHED
SCENE	2S	SECOND TO SHED
SCENE	3S	THIRD TO SHED
SCENE	4S	FOURTH TO SHED
ENROUTE	1R	FIRST TO SHED
ENROUTE	2R	SECOND TO SHED
ENROUTE	3R	THIRD TO SHED
ENROUTE	4R	FOURTH TO SHED

S-1 OPERATION TABLE

NOTE THAT S-1 PREVENTS THE LOAD MANAGER FROM SHEDDING A LOAD THAT HAS BEEN SEQUENCED "ON"

(see Figure 5, Circuit Board Layout for location of S-1)

S-1	INTERLOCK SWITCH	CHANNEL SEQUENCED
	(PARK BRAKE OR NEUTRAL SAFETY SWITCH)	(BUT NOT LOAD MANAGED)
ON	ON	4S
ON	OFF	4R
OFF	ON	XXXX
OFF	OFF	XXXX

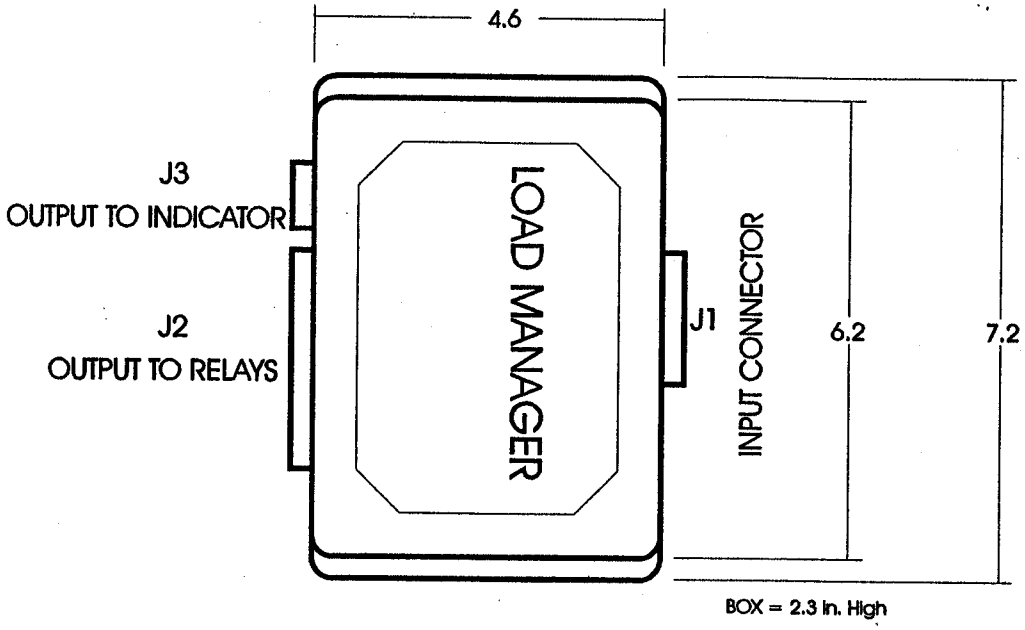


Figure 1

CONNECTOR ARRANGEMENT
And OUTLINE DIMENSIONS

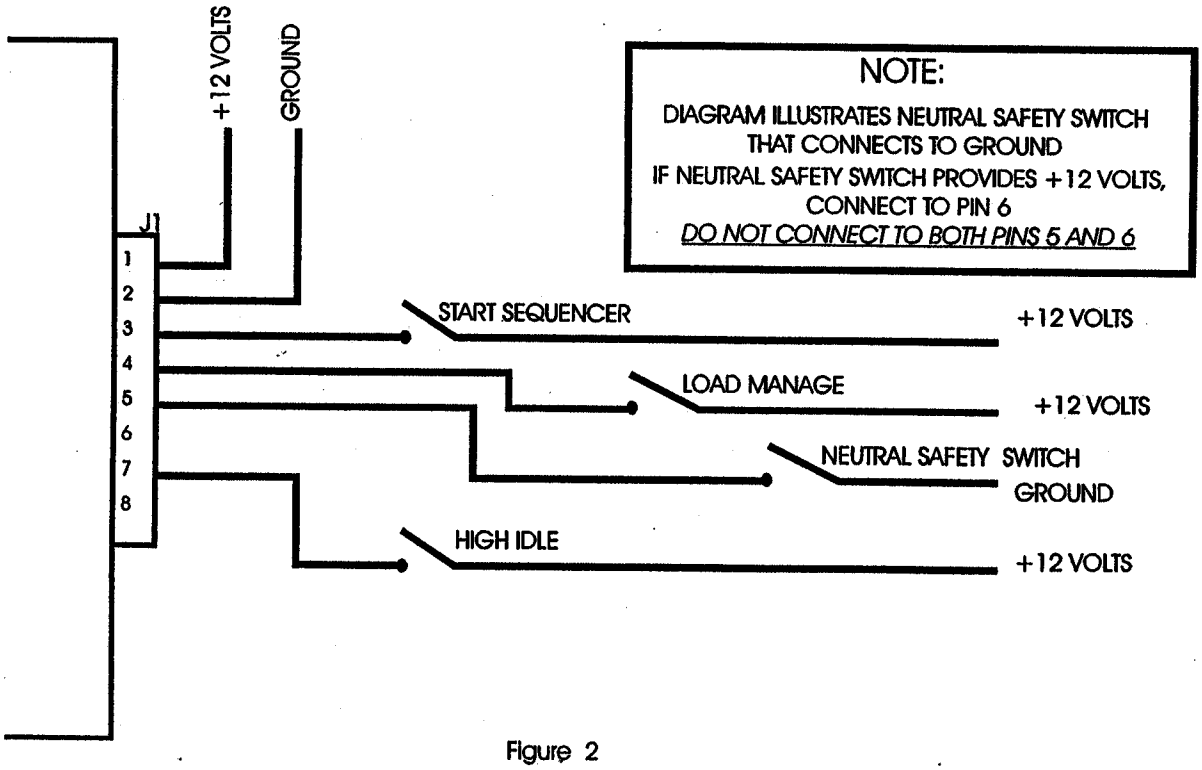
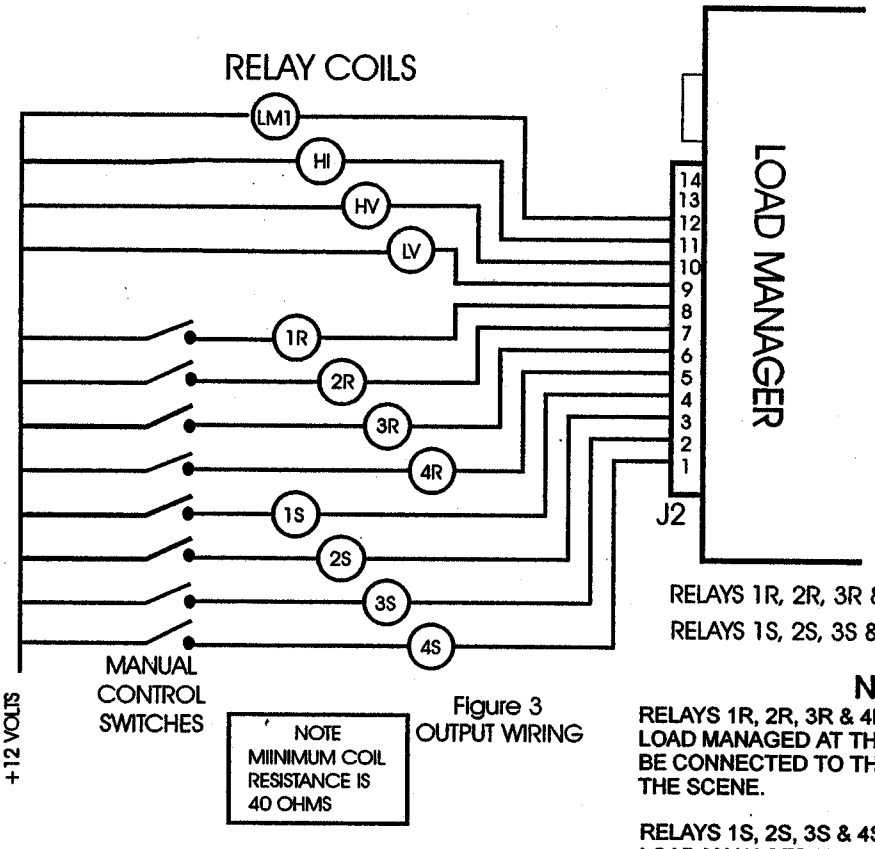


Figure 2

INPUT WIRING



NOTE
MIINIMUM COIL RESISTANCE IS 40 OHMS

Figure 3
OUTPUT WIRING

RELAYS 1R, 2R, 3R & 4R ARE SHED ENROUTE
RELAYS 1S, 2S, 3S & 4S ARE SHED AT SCENE

NOTE:

RELAYS 1R, 2R, 3R & 4R WILL BE "ON" AND NOT LOAD MANAGED AT THE SCENE. THEY ARE TO BE CONNECTED TO THOSE LOADS NEEDED AT THE SCENE.

RELAYS 1S, 2S, 3S & 4S WILL BE "ON" AND NOT LOAD MANAGED WHILE ENROUTE. THESE RELAYS ARE TO BE CONNECTED TO THE LOADS NEEDED ENROUTE.

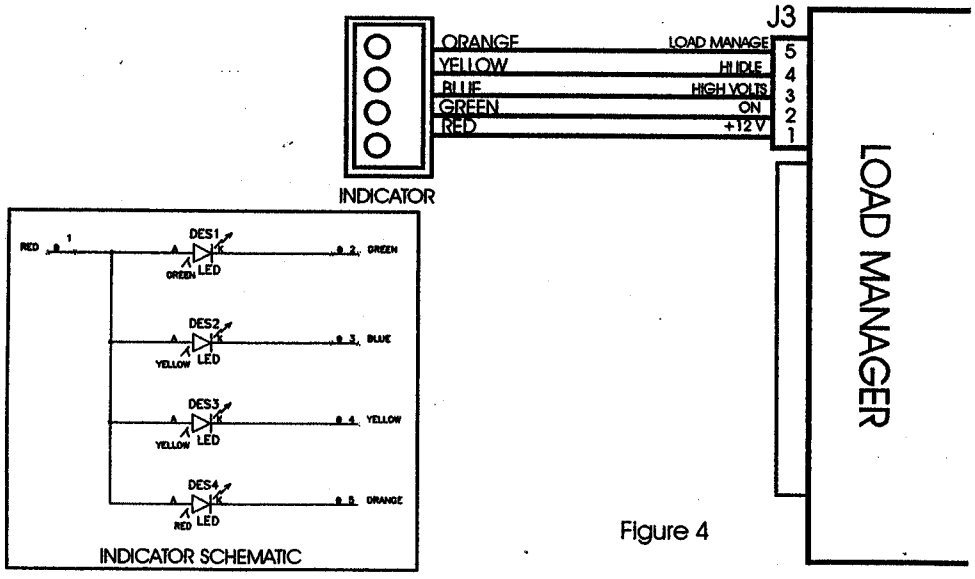


Figure 4

INDICATOR WIRING

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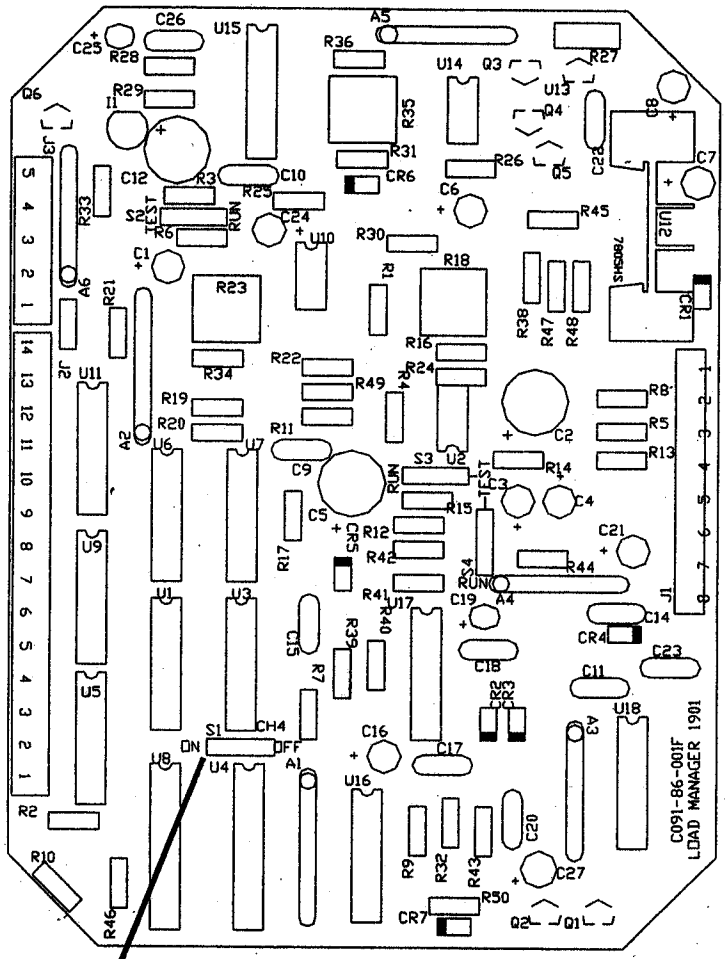

NOTE:

SWITCHES S2, S3 & S4 ARE FOR FACTORY CALIBRATION,

DO NOT CHANGE POSITION IN THE FIELD

Figure 5

LOAD MANAGER 1901

CIRCUIT BOARD LAYOUT

INSTALLATION RECORD & WARRANTY

Date Installed_____

Installed By_____

Vehicle Identification_____

Vehicle Owner_____

WARRANTY

All products of Kussmaul Electronics Company Inc. are warranted to be free of defects of material or workmanship. Liability is limited to repairing or replacing at our factory, without charge, any material or defects which become apparent in normal use within 3 years from the date the equipment was shipped. Equipment is to be returned, shipping charges prepaid and will be returned, after repair, shipping charges paid.

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