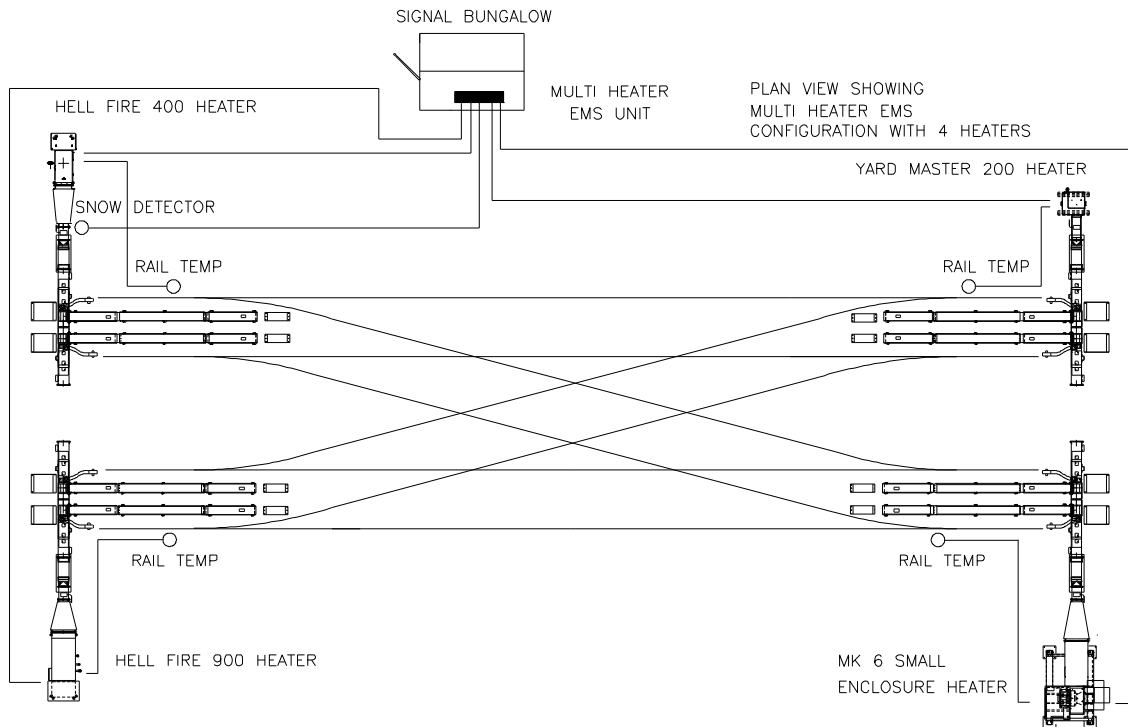


# Multi-Heater Energy Management System, Installation, Operation and Parts Manual



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2793 Fenton Road  
Ottawa, Ontario, Canada K1T 3T9  
Phone: (613) 822-1765  
Fax: (613) 822-1556 [www.hovey.ca](http://www.hovey.ca)



# **CONGRATULATIONS**

## **on your purchase of a Multi Heater**

### **Energy Management System**

An Energy Management System (EMS) ensures heaters are turned on only when there is freezing rain or snow, and to run them as long as necessary to keep the switch clear.

The EMS monitors the heaters' function and indicates alarm, with a contact closure, in the event of a problem.

<b>Feature</b>	<b>Benefit</b>
Optimum Energy Saving Logic	Save fuel, extend equipment life and save \$'s by turning heaters on only when needed.
Controls up to six heaters	Minimize system cost.
Simple control wiring	Use existing control wiring, or reduce installation cost of new installations.
Field programmable	Operators can input their experience
Switch warm function	Used to melt hard to detect, snow drift, fallen ice and frost by turning the heaters on at a regular interval when snow is not detected.
Low temp cut off function	Avoids nuisance shutdown and manual reset of propane fired heaters, caused by inadequate vapour pressure at low temperatures.
Heart beat function	Turns on all heaters once a day to verify operation. In the event a heater fails, the EMS indicates alarm allowing the dispatcher to contact maintenance forces in advance of any forecasted snowstorms.
Manual run timer	Allows track personnel to verify the heater operation, and temporarily operate them in the event the switches are fouled with ice or snow.
Dispatch run timer	Cuts down on excessive dispatch run time by turning the heater off after a maximum run time.
Stagger start timers	Allows the heaters to be started in sequence, reducing the in rush current and corresponding line and breaker sizes.
Display	The display window shows the status of all inputs and outputs, and various text messages including heater status and alarms.
Test cycle	Verifies all heaters are connected correctly.

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ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ PROVINCE/STATE: \_\_\_\_\_

POSTAL/ZIP CODE: \_\_\_\_\_ TELEPHONE: \_\_\_\_\_

PRODUCT PURCHASED: MULTI HEATER EMS \_\_\_\_\_

MODEL #: **18337-** \_\_\_\_\_ SERIAL #: \_\_\_\_\_

DATE OF PURCHASE: \_\_\_\_\_ INSTALLER: \_\_\_\_\_

## 1.0 COMPATIBLE SWITCH HEATERS

The MULTI HEATER EMS is compatible with the following heaters:

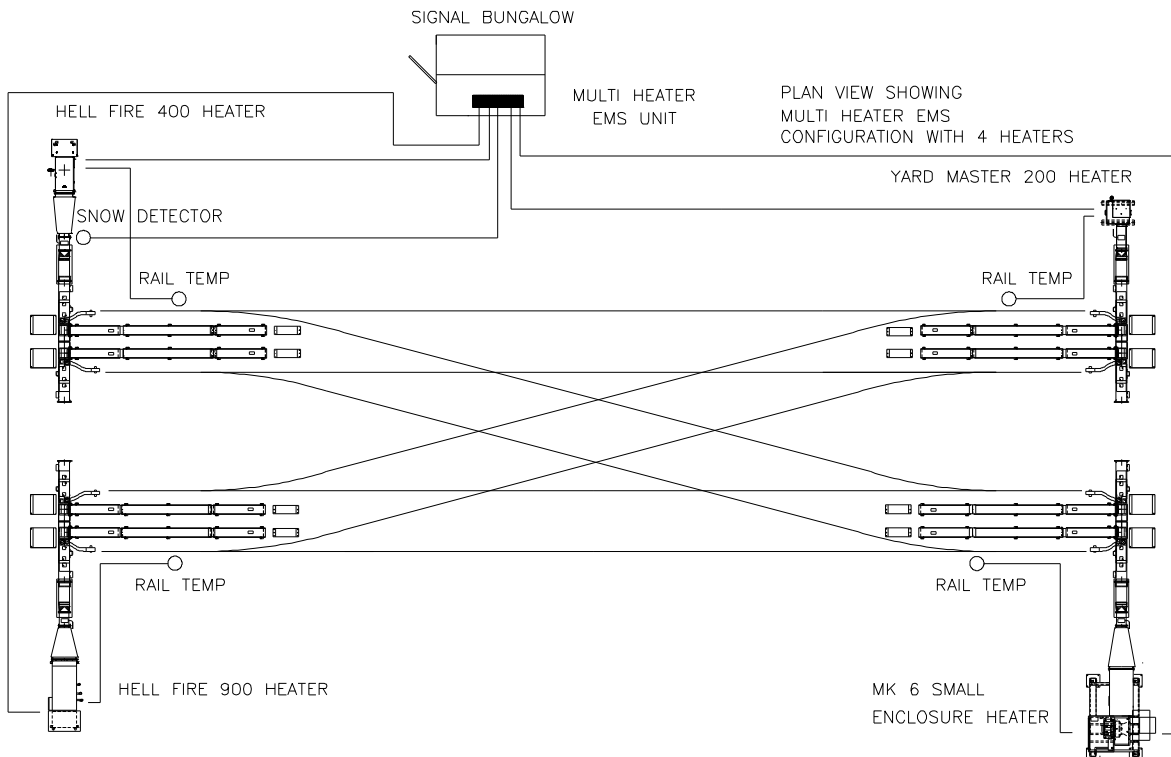
- I. Mark V micro series Gas fired
- II. Mark VI Series Gas fired
- III. Mark VII Series Gas fired Propane engine driven
- IV. Yard Master Series Gas fired
- V. HF400 Series Gas fired
- VI. HF900 Series Gas fired
- VII. Special applications

## 2.0 MULTI HEATER EMS, THEORY OF OPERATION

The Multi Heater EMS is ideal for, double or triple crossovers, and yard situations with up to six heaters.

The Multi heater EMS controls up to 6 heaters independent of each other. This simplifies the wiring between the heaters and EMS. Only one set of sensors are needed. A second precipitation sensor can be added. Indication to dispatch is provided and maintained by the EMS. The EMS controls all heaters turning them on and off as required. In an alarm situation, the EMS indicates alarm to dispatch, while continuing to request the faulty heater and control all others according to the conditions.

Manually adjustable parameters, make the Multi heater EMS easy to use and fine tune to the location and needs of the Rail Road.



## **2.1 Functions**

The available EMS functions are described here. For parameter adjustments, see the PARAMETERS section.

### **NORMAL**

Snow is detected when the precipitation detector senses moisture and the ambient temperature is below freezing (the snow/rain set point).

Whenever snow is detected for more than the duration of the delay on period, the heaters are started, dispatch indication contact is closed, and they continue to run as long as snow is detected. Once the snow stops the heaters continue to run for the duration of the delay off period, then the indication contact is opened.

### **TIMED DISPATCH**

When enabled, heaters requested by dispatch are turned off after an adjustable run time by the EMS, saving fuel and excess run time. Once turned off, the EMS continues to control the heaters according to the environmental conditions. The dispatcher can re-request the heaters for additional run time. If the function is disabled the heaters run as long as requested by dispatch.

### **SWITCH WARM**

When enabled, the EMS cycles the heater regardless of detecting snow. The ambient temperature has to be below the SWITCH WARM TEMP. set point for the duration of the wait period. Toggle switch SW3 enables this function. This function is effective at clearing hard to detect drifting snow and fallen ice debris from passing trains.

### **LOW TEMPERATURE CUT OFF**

Propane does not vaporize below  $-44^{\circ}$  F.

When enabled the EMS can avoid nuisance alarm shut downs and subsequent manual reset of propane fired heaters due to low ambient temperatures and tank vapour pressure. The EMS stops the heaters when the ambient temperature drops below the LOW TEMP set point. If requested by dispatch, indication is maintained. Toggle switch SW4 enables this function.

### **HEART BEAT**

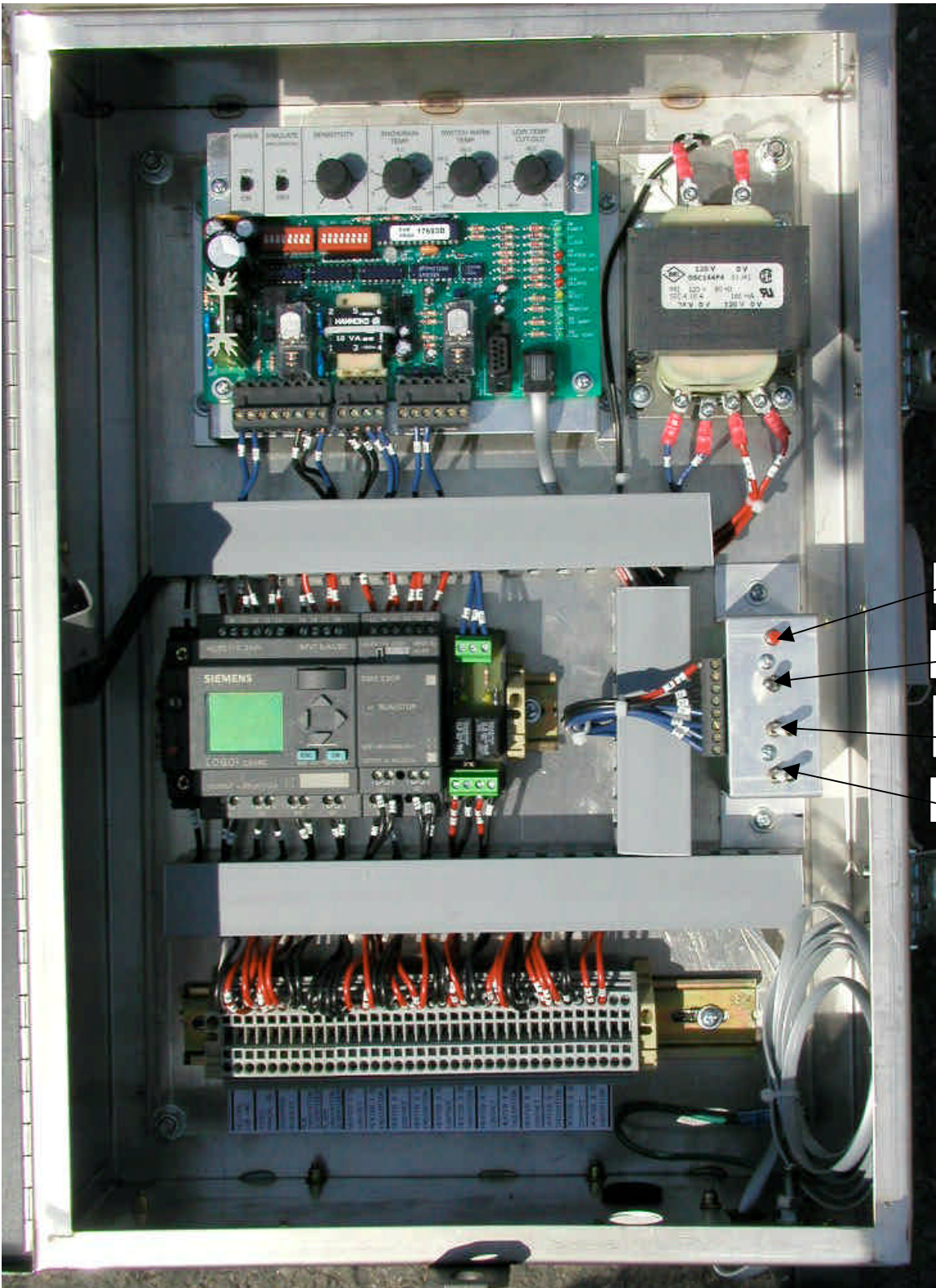
When enabled, this function starts the heaters periodically to verify their operation. No run indication is made to dispatch. If a heater fails, the EMS closes the alarm indication contact. In the function two timers are available. A yearly timer, B06, to set the month and day when to start and stop the function. The weekly timer, B07, to set the day and time when the function is to test the heaters.

### **TIMED MANUAL**

By installing a momentary push button at a convenient location, local track personnel can start and stop the heaters without accessing the EMS. The run time is limited and stops the heaters if left running. No indication is made. If a heater fails, then the EMS indicates alarm to dispatch.

### **TEST**

Pressing the "TEST" button, located inside the EMS, starts all the heaters. Used to verify and troubleshoot the connections between the EMS and the heaters.



TEST

EMS ENABLE

SWITCH WARM  
ENABLE

LOW TEMP ENABLE

## 2.2 Key Components

This EMS is based on the EMS board 15919 and the Siemens LOGO, as used in the HELLFIRE heater. The EMS board provides all environmental inputs such as ambient temperature and precipitation, switch warm and low temp set points.

The LOGO receives information from the EMS board and turns the heaters on and off according to the programmable parameters, and provides indication to the dispatcher.

The EMS is equipped with the following inputs and outputs:

### Inputs:

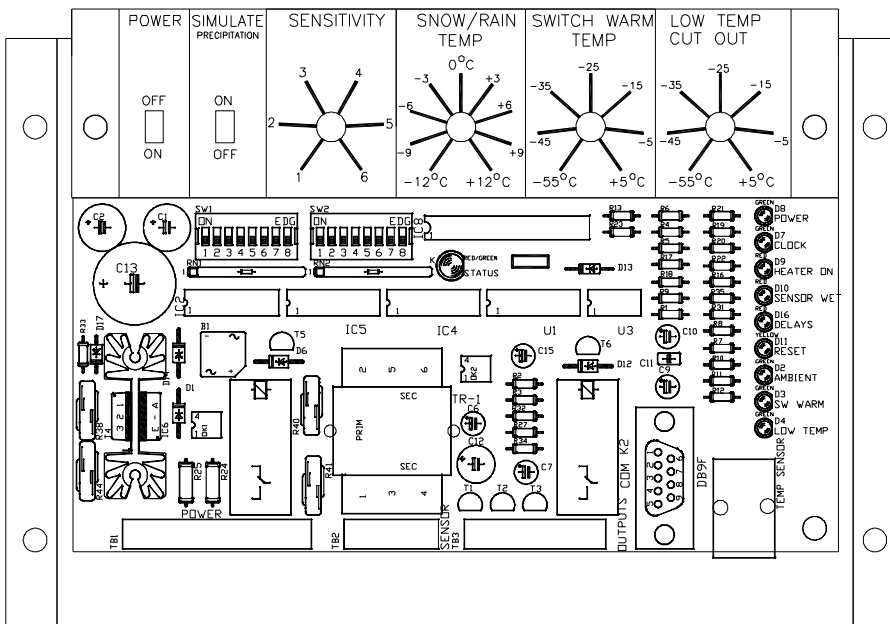
- C A precipitation detector, to detect snow or rain
- C An ambient air temperature sensor
- C Dispatcher input
- C Low temperature cut out enable switch
- C Switch warming temperature enable switch
- C Run indication for each connected heater
- C Manual timed ON
- C EMS enable / disable
- C Test switch

### Outputs:

- C 6 Heater control contacts
- C Dispatch Heater run indication contact
- C Dispatch Heater alarm indication contact

## 2.3 EMS board operation and adjustments.

The EMS board, 15919, monitors the environmental conditions, and based on various set points sends out a signal to the controller to turn the heaters on. All set points are easily adjustable with the dials on top of the EMS board. A power switch and a moisture simulation switch are provided to allow resetting or disabling the EMS and to aid in troubleshooting. On the right side of the board are a number of LED's that indicate the status of the EMS board.



### 2.3.1 Switch and dial descriptions

POWER ON/OFF	This turns the power to the EMS OFF/ON. This switch is used to reset the EMS in case of a lockout
SIMULATE PRECIPITATION ON/OFF	This is normally OFF. To simulate moisture (snow or rain) move the switch to the ON position and the EMS receives a signal that the sensor is wet. Used to troubleshoot and test the EMS.
SENSITIVITY	This dial is used to adjust the sensitivity of the precipitation sensor. 6 is maximum sensitivity and 1 least sensitive, i.e. needs more moisture on sensor. Factory set at 3.5.
SNOW RAIN TEMP	Adjustable set point from $-12^{\circ}\text{C}$ to $+12^{\circ}\text{C}$ Celsius. If the ambient temperature is below this set point and the EMS senses any moisture it will turn the heaters on. Above this set point the EMS sees rain and not snow and will not turn the heaters on.
SWITCH WARM TEMP	This set point turns the switch warm function on or off. When the ambient temperature is below this set point, for an adjustable time in hours, the EMS will turn the heaters on for a certain, also adjustable time, in minutes.
LOW TEMP CUT OUT	This set point determines the temperature at which the heaters will be turned off. Usually set to $-35^{\circ}\text{C}$ . Propane does not provide adequate vapour pressure below $-40^{\circ}\text{C}$ . By turning the heaters off at temperatures below that set point, alarm shutdowns and manual resets are avoided. Natural gas fired heaters or propane tanks with heaters do not require this feature.
DELAY ON, DELAY OFF DIP SWITCHES	These switches are used to set the DELAY ON and DELAY OFF times for the EMS operation. The value for the time is calculated by adding the binary code value of the actual switch in minutes. Minimum step is one minute. The values of the switches are 1, 2, 4, 8, 16, 32, 64, 128 and any combination between and up to 255 minutes.

### 2.3.2 Status LED descriptions

LED	Description
POWER	Indicates 12 V DC present on the board
CLOCK	Blinking once a second, internal clock is working
HEATER ON	Heater relay is energised. Heaters requested to run.
SENSOR WET	Indicates the sensor is wet or simulated wet
DELAYS	Shows the delay status Delay ON - If Lit and HEATER ON LED is NOT lit. Delay OFF - If Lit and HEATER ON LED is lit. Blinking -Delay timer reset. If Dark -NO delay time active.
RESET	<b>NOT APPLICABLE.</b>
AMBIENT	Ambient temperature is below SNOW/RAIN TEMP set point and the sensor is wet.
SW WARM	Ambient temperature is below the SWITCH WARM set point. Activates the switch warm function.
LOW TEMP	When the ambient temperature drops below the LOW TEMP set point, the EMS turns off the heaters to avoid a loss of flame signal alarm due to inadequate gas supply pressure. HEATER ON LED is dark. The heaters are allowed to operate again once the temperature rises above the set point.
STATUS	The status LED shows the state of the EMS processor. Green with a red flash indicates normal function. Toggle red green once a second indicates the reset timer is running. Solid red indicates the EMS board is in alarm and must be reset.

## **2.4 Description and function**

The heart of the MULTI HEATER EMS is the SIEMENS LOGO!. The LOGO! is installed with one extension module. The extension module provides additional inputs and outputs.

The LOGO!;

- monitors the inputs at all times and turns the heaters on or off according accordingly.
- provides the RUN and ALARM indication to the dispatcher.
- display shows the heaters status and any messages.

### **2.4.1 LOGO! input and outputs**

<b>Input</b>		<b>Output</b>	
1	EMS board heater request relay	1	Run indication to dispatcher
2	Switch warm relay	2	Alarm indication to dispatcher
3	Low temp relay	3	Heater 1 control contact
4	Dispatch request	4	Heater 2 control contact
5	Test cycle switch	5	Heater 3 control contact
6	Timed manual	6	Heater 4 control contact
7	Heater 1 run indication	7	Heater 5 control contact
8	Heater 2 run indication	8	Heater 6 control contact
9	Heater 3 run indication		
10	Heater 4 run indication		
11	Heater 5 run indication		
12	Heater 6 run indication		

## 2.4.2 Parameters

The LOGO has a number of adjustable parameters. See table below.

PARAMETER	Name	Description	Default
B01	Dispatch timer enable	Software switch used to turn the Dispatch timer function ON or OFF.	OFF
B02	Dispatch run time	When the dispatch timer function is ON, this is the length of time the heaters will run when requested by dispatcher. Once the run time expires, the heaters are turned off.	30 minutes, (0–99 min.)
B03	Manual run time	A push button function for track personal. Once pressed the EMS turns on all heaters for an adjustable time. No indication is provided to dispatcher.	30 minutes (0–99 min.)
B04	Switch warm function timer	“COLD TIME”, is the time the ambient temperature MUST be below the “SW TEMP” set point.  “RUN TIME”, is the time that the heaters are run after the “COLD TIME” expires.	24 hours (0–99 hours)  30 minutes (0–99 min.)
B05	HEART BEAT function enable	This software switch turns the heart beat function on or off.	OFF
B06	Year timer	The period of the year the heart beat function is active.	Oct 1 to April 1 (Jan 1 to Dec31)
B07	Weekly timer	Select the days of the week to test the heaters, and set the test time and duration.	Monday to Sunday inclusive  4:00 to 4:30 (0:00 to 24:00)
B08	Test cycle timer	Turns on all heaters regardless of conditions. Used to test the EMS connections to the heaters.	10 minutes (0–99 min.)
B13	HEATER 3 enable	Enables control of heater 3.	OFF
B14	HEATER 4 enable	Enables control of heater 4.	OFF
B15	HEATER 5 enable	Enables control of heater 5.	OFF
B16	HEATER 6 enable	Enables control of heater 6.	OFF
B21	HEATER 1 delay start timer	Used to stagger start the heaters.	0 sec (0–99 sec.)
B22	HEATER 2 delay start timer	Used to stagger start the heaters.	5 sec. (0–99 sec.)
B23	HEATER 3 delay start timer	Used to stagger start the heaters.	10 sec. (0–99 sec.)
B24	HEATER 4 delay start timer	Used to stagger start the heaters.	15 sec. (0–99 sec.)
B25	HEATER 5 delay start timer	Used to stagger start the heaters.	20 sec. (0–99 sec.)
B26	HEATER 6 delay start timer	Used to stagger start the heaters.	25 sec. (0–99 sec.)

## Parameter adjustment

All parameters are adjustable on the LOGO front display. To access the parameters, press ESC, cursor down to SET PARAM and press OK. The first parameter is displayed. Cursor through, with the up or down arrow, to the desired parameter, and press OK. The cursor blinks on the first digit of the timer and the value can be changed with the up or down arrow. The right or left arrow changes to the next digit. Once the desired value is entered, press OK and the new value is stored. To abort a change, press ESC.

At least two heaters must be controlled by the EMS, "HEATER1" and "HEATER2". Parameters B13 to B16 allows you to enable/disable the last four heaters. E.G. If operating only four heaters you must enable (ON) two of the four disabled heater positions, B13 to B16.

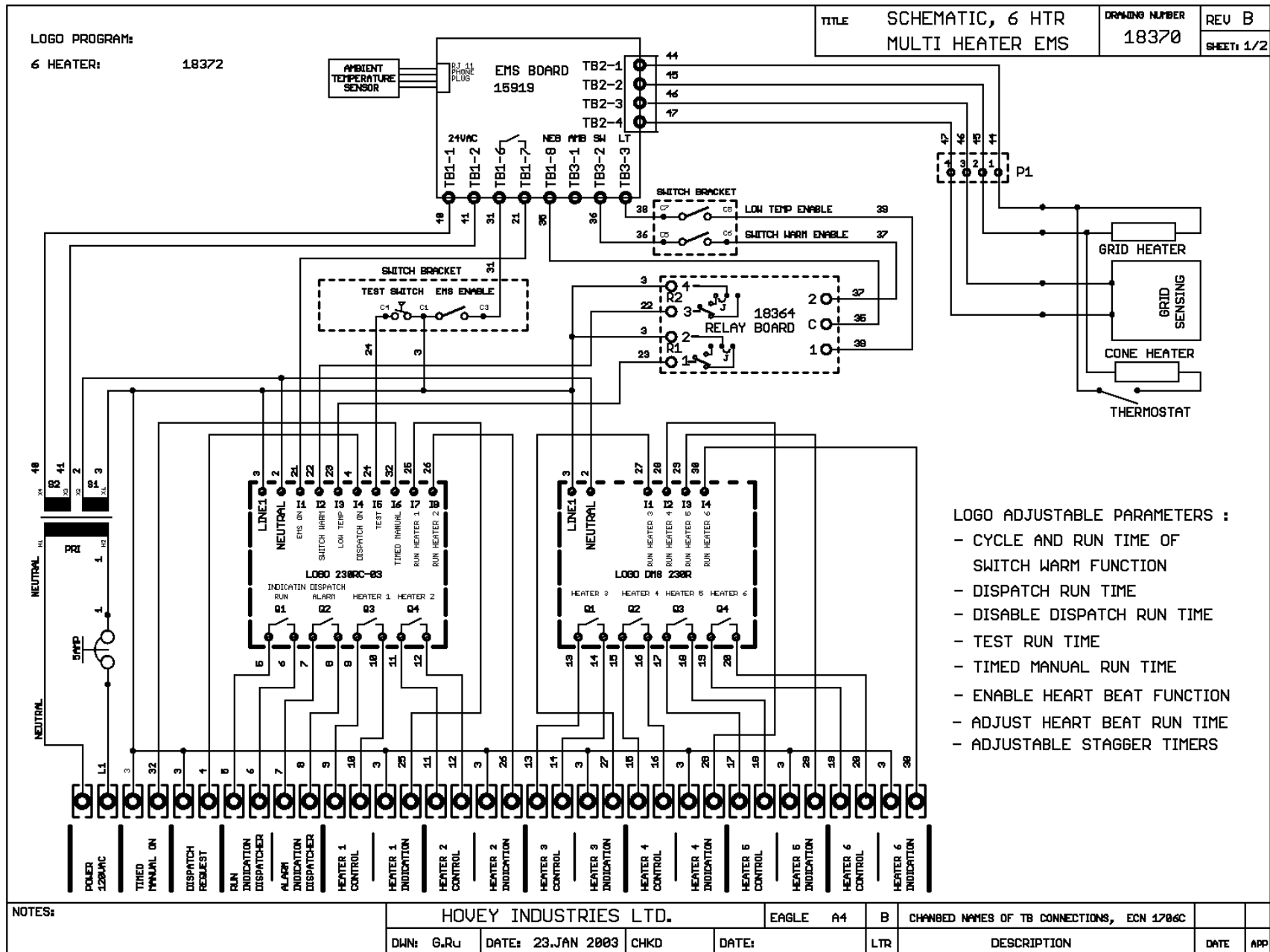
Parameters B13 to B16 show "Switch=ON" or "Switch=OFF" on the display. Press OK and the cursor blinks ON or OFF. Press the up or down arrow to change to the other status. Press OK to save the new status.

Parameter B21 to B26 default to stagger start the heaters in 5 second intervals. Stagger starting minimizes initial start up current, to reduce line and circuit breaker sizes, and avoid brown outs. This parameters are adjustable from 0 to 99 seconds allowing the heaters to be started in any order. Typically the heater furthest away from the power source is started first.

To go back to the INPUT, OUTPUT or CLOCK display press ESC twice.

### 3.0 WIRING

### 3.1 Schematic



## 3.2 Wire connections and electrical specs

### 3.2.1 Specifications

Input 120 Vac, 2 Amp Max.

Precipitation detector operates at 24 Vac

Power to LOGO is isolated 120V AC

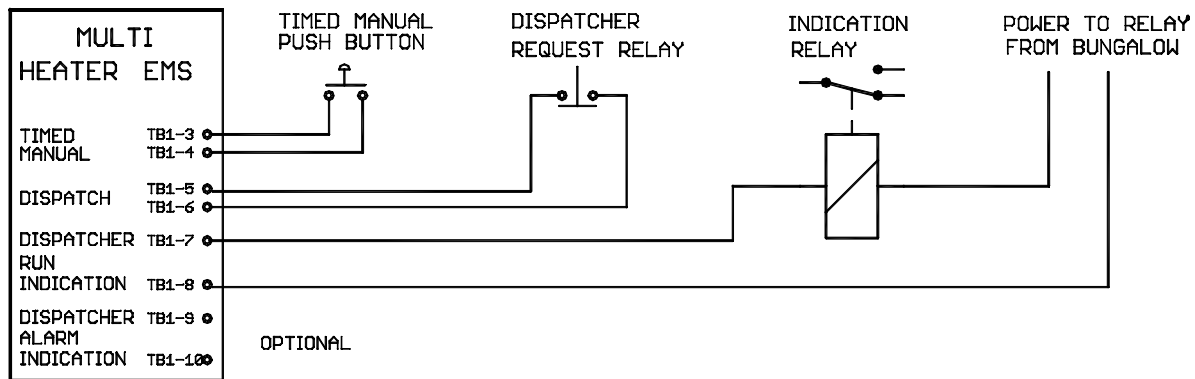
Indication lines from EMS to heaters are 120V AC from isolated source

Relay Contacts 240VAC 8Amp

All wires are AWG 18

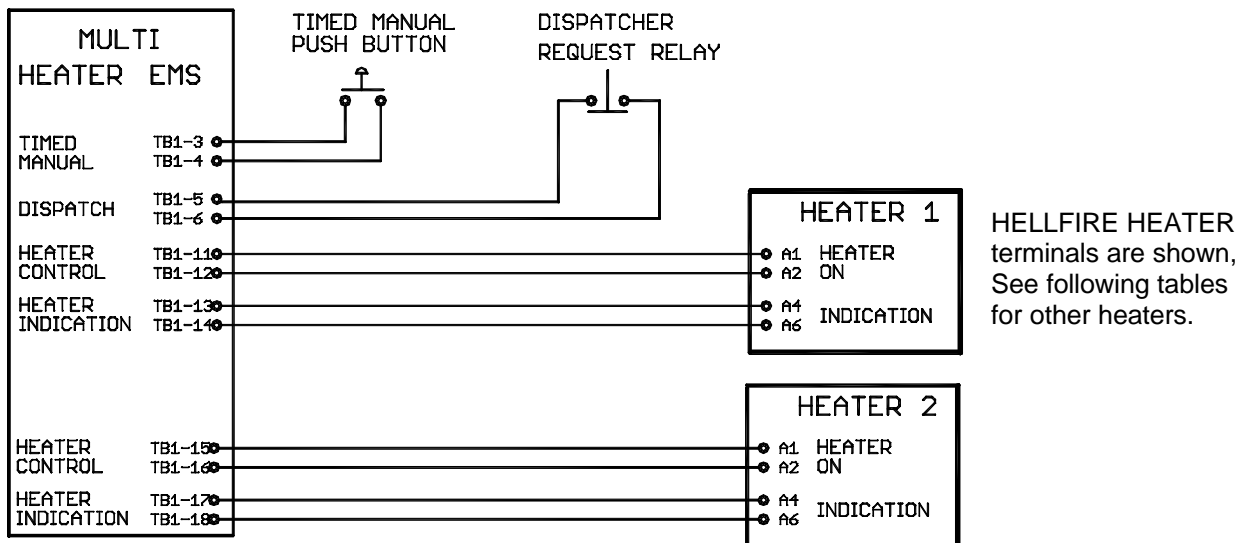
### 3.2.2 Wire connection between EMS and Dispatcher

The wiring of heaters to dispatch and EMS control is much simplified by using the MULTI HEATER EMS. All connections to and from dispatcher, signal bungalow, are made only to the EMS and not to every heater. Control and indication to dispatcher is provided by the EMS only and not the heater directly. The heaters are checked by the EMS for proper functioning.



### 3.2.3 Wire connections between heaters and EMS

The wiring from the EMS to the heaters requires only four control wires. Two for control, (on/off), and two indication wires.



### 3.3 Heater connections

#### 3.3.1 Terminal Connections For HELLFIRE Heaters HF400, HF900

CONNECTION IN HEATER		CONNECTIONS IN EMS					
		HEATER 1	HEATER 2	HEATER 3	HEATER 4	HEATER 5	HEATER 6
CONTROL WIRES	A1	TB1 - 11	TB1 - 15	TB1 - 19	TB1 - 23	TB1 - 27	TB1 - 31
	A2	TB1 - 12	TB1 - 16	TB1 - 20	TB1 - 24	TB1 - 28	TB1 - 31
INDICATION WIRES	A4	TB1 - 13	TB1 - 17	TB1 - 21	TB1 - 25	TB1 - 29	TB1 - 31
	A5	TB1 - 14	TB1 - 18	TB1 - 22	TB1 - 26	TB1 - 30	TB1 - 31

#### 3.3.2 Terminal connections for YARDMASTER heater

Control and Run indication to the EMS connect the following wires:

CONNECTION IN HEATER		CONNECTIONS IN EMS					
		HEATER 1	HEATER 2	HEATER 3	HEATER 4	HEATER 5	HEATER 6
CONTROL WIRES	TB1 - 4	TB1 - 11	TB1 - 15	TB1 - 19	TB1 - 23	TB1 - 27	TB1 - 31
	TB1 - 5	TB1 - 12	TB1 - 16	TB1 - 20	TB1 - 24	TB1 - 28	TB1 - 31
INDICATION WIRES	TB2 - 1	TB1 - 13	TB1 - 17	TB1 - 21	TB1 - 25	TB1 - 29	TB1 - 31
	TB2 - 2	TB1 - 14	TB1 - 18	TB1 - 22	TB1 - 26	TB1 - 30	TB1 - 31

#### 3.3.3 Terminal Connections For Mark 6 Heaters

Before making any connections, confirm the following, run and alarm indication contact closures provided by the heater.

Terminals A7, A8, and A9 have been reserved for use by the EMS. A7 is the common, A8 is the alarm, and A9 is the run indication. Use an ohmmeter to check the contact position. With the heater off A7 to A9 will be an open circuit, and A7 to A8 will be open. With the heater running, A7 to A9 will be closed, and A7 to A8 will be open. Only when the heater is in alarm will A7 to A8 close.

If the alarm contact toggles open and closed without the heater actually going into alarm, you will need to remove wire 24 connected to terminal 21 of the request relay in a small enclosure Mark 6 heater.

CONNECTION IN HEATER		CONNECTIONS IN EMS					
		HEATER 1	HEATER 2	HEATER 3	HEATER 4	HEATER 5	HEATER 6
CONTROL WIRES	A1	TB1 - 11	TB1 - 15	TB1 - 19	TB1 - 23	TB1 - 27	TB1 - 31
	A2	TB1 - 12	TB1 - 16	TB1 - 20	TB1 - 24	TB1 - 28	TB1 - 31
INDICATION WIRES	A7	TB1 - 13	TB1 - 17	TB1 - 21	TB1 - 25	TB1 - 29	TB1 - 31
	A9	TB1 - 14	TB1 - 18	TB1 - 22	TB1 - 26	TB1 - 30	TB1 - 31

### 3.3.4 Terminal Connections for Mark VII Heaters (Manufactured after July/97)

Before making any connections, confirm the following, run and alarm indication contact closures provided by the heater

Terminals A4, A6 are used for run indication. Terminals A4, A5 are used for alarm indication.

Control and Run indication to the EMS connect the following wires:

CONNECTION IN HEATER		CONNECTIONS IN EMS					
		HEATER 1	HEATER 2	HEATER 3	HEATER 4	HEATER 5	HEATER 6
CONTROL WIRES	A1	TB1 - 11	TB1 - 15	TB1 - 19	TB1 - 23	TB1 - 27	TB1 - 31
	A2	TB1 - 12	TB1 - 16	TB1 - 20	TB1 - 24	TB1 - 28	TB1 - 31
INDICATION WIRES	A4	TB1 - 13	TB1 - 17	TB1 - 21	TB1 - 25	TB1 - 29	TB1 - 31
	A6	TB1 - 14	TB1 - 18	TB1 - 22	TB1 - 26	TB1 - 30	TB1 - 31

### 3.3.5 Terminal Connections For Mark V Micro Series Heaters

Control and Run indication to the EMS connect the following wires:

CONNECTION IN HEATER		CONNECTIONS IN EMS					
		HEATER 1	HEATER 2	HEATER 3	HEATER 4	HEATER 5	HEATER 6
CONTROL WIRES	A1	TB1 - 11	TB1 - 15	TB1 - 19	TB1 - 23	TB1 - 27	TB1 - 31
	A2	TB1 - 12	TB1 - 16	TB1 - 20	TB1 - 24	TB1 - 28	TB1 - 31
INDICATION WIRES	A7	TB1 - 13	TB1 - 17	TB1 - 21	TB1 - 25	TB1 - 29	TB1 - 31
	A9	TB1 - 14	TB1 - 18	TB1 - 22	TB1 - 26	TB1 - 30	TB1 - 31

#### 4.0 CONFIGURATION, ADJUSTMENTS & MAINTENANCE

- C To stagger start the heaters set the delay timer in the EMS. Start the heater furthest away from the power feed first. The heater closest to the power feed last. This limits the voltage drop at start up, to a minimum.
- \* The sensing grid in the precipitation detector should be cleaned with a soft cloth at least once a season.
- \* The sensitivity of the precipitation detector can be increased or decreased by varying the adjustment knob on the EMS board. "1" being the least and "6" the most sensitive
- \* The ambient temperature set point can be adjusted by the dial on the EMS board.
- \* The delay on timer (5 minute default) keeps the heater off for a predetermined amount of time during which the precipitation sensor must be wet. This timer is built into the EMS board and is adjustable from 1 to 256 minutes using the DIP switches on the EMS board.
- \* The delay off timer keeps the heater running for a predetermined amount of time once the precipitation detector becomes dry. It is also built into the EMS board and is adjustable from 1 to 256 minutes using the DIP switches on the EMS board.
- C The red push button on the switch bracket, SW1, is used to start a test cycle. Pushed once the EMS turns on all heaters regardless of any conditions, low temp etc, except the heaters that are unable to start because of failure. The test cycle runs for a predetermined time.
- \* There are three "Enable/Disable" toggle switches located within the EMS control box. The first toggle switch, SW2, controls the operation of the EMS, the second toggle switch, SW3, controls the switch-warming feature, the third toggle switch, SW4, controls the low temperature cut out feature

**Note :** By disabling the EMS, the heater will not be turned on by the EMS. This does not mean the heaters have been disabled or that the EMS has been powered off. The EMS still maintains indication to dispatch and runs the heaters on dispatch control as well as the switch warm feature, low temp cut out, timed manual, test features and heart beat function.

## 5.0 INSTALLATION PROCEDURE

### 5.1 Installation of EMS control box

Position the EMS control box on an inside wall of a signal bungalow (or any other convenient bungalow). The EMS can be mounted outside if necessary. Mount the box to the wall using the four self-drilling screws provided. Four mounting holes are provided on the top and bottom of the box for ease of installation.

On the bottom of the EMS box is an aluminium plate. Drill as many holes as needed for strain relief's. Feed the wires through and connect to the proper location on the terminal block.

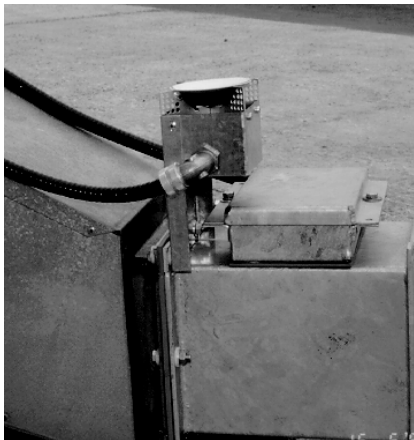
Mount the Ambient temp sensor outside preferably on the north face of the bungalow in a shady place. Avoid any heat sources which will give a false reading. Feed wire through into the EMS box and plug into the EMS board.

If mounted outside, the ambient sensor can be mounted to the two studs on the bottom of the control box. Remember it needs to be shaded from direct sun.

Once all wires are connected adjust the parameters as required, including software switches, B13 to B16 to enable the connected heaters.

Adjust the stagger timers, B20 to B26 such that the heater furthest away from the power feed starts first and the heater closest to the power feed starts last.

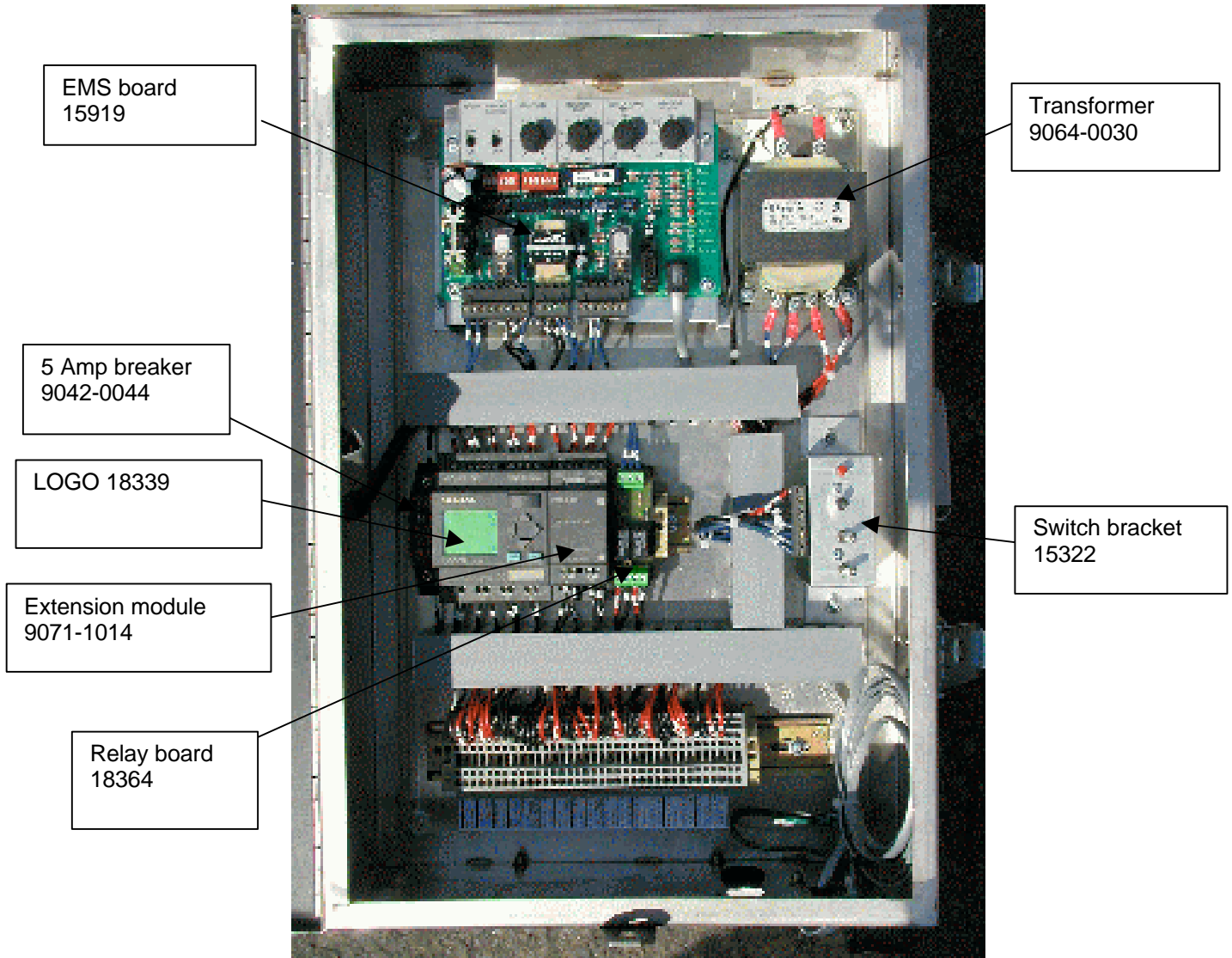
### 5.2 Snow detector installation



The Snow Detector is to be mounted on the sensor duct of a heater close to the EMS control box location. Keep the detector as close to the switch and as low to the ground as possible. Mounting the detector low will improve the detection of drifting snow. Mount the detector to the sensor duct flange, as shown. Mounting to the flange allows the residual heat from the duct to clear the detector for the next snowfall.

If the EMS is mounted on a heater and the precipitation sensor whip is long enough connect the conduit to one of the holes in the bottom of the EMS control box and plug in the mating 4 pin connector. If you need a longer wire connection, use the supplied whip with the two 4 pin connector plugs. Cut it in half and splice the required length of wire between the two halves. Make sure that the black power and blue sensing wires connect to the corresponding wires on the other end.

## 6.0 SPARE PARTS



PROGRAM, 6 HEATER 18372

To accurately select the correct part for your MULTI HEATER EMS please have the model and serial number ready when placing an order.



Precipitation detector,  
part number 16441-01



Precipitation detector head only,  
part number 16707



Sensing grid only,  
Part number 17695



Ambient temperature sensor,  
part number 16426



Main service surge arrester kit  
15344  
(OPTION)

7.0 TROUBLESHOOTING CHART

<b>Problem</b>	<b>Conditions</b>	<b>Probable Cause</b>	<b>Remedy</b>
None of the heaters turn on	Snowing No display on LOGO. No lights on EMS board	Power disconnected or turned off.	Restore 5 amp breaker, Restore power.
	Snowing. LOGO display lit. EMS POWER LED lit. CLOCK LED lit. PRECIP LED lit . AMBIENT LED NOT lit.	Ambient temperature set point is set below freezing. No Input 1.	Raise ambient temperature set point above freezing.
	Snowing. LOGO display lit. EMS POWER LED lit. CLOCK LED lit. PRECIP LED NOT lit. AMBIENT LED lit.	Precipitation sensitivity set to low.	Raise set point.
	Snowing. LOGO display lit. EMS POWER LED lit. CLOCK LED lit. PRECIP LED lit. AMBIENT LED lit.	Rail is warm. Rail temp switch open on heater, will not run.	Allow rail to cool below +3C (38F), or check function of rail thermostat.
	Snowing. LOGO display lit. INPUT I1 NOT lit. EMS same as above.	EMS disabled.	Toggle switch SW2 on switch bracket to enable, Input I1 will lit.
	Snowing. LOGO display lit. EMS POWER LED lit. CLOCK LED lit. PRECIP LED NOT lit. AMBIENT LED lit. DELAY LED lit.	EMS is in Delay on mode.	Wait for the delay period. (Factory set at 5 minutes)
	Snowing. LOGO DISPLAY lit. OUTPUT Q2 ON. EMS STATUS LED SOLID RED.	EMS and / or LOGO in ALARM mode.	Turn power off at 5 amp circuit breaker for 10 seconds, and reconnect.
	Snowing. LOGO Display lit. OUTPUT Q1 ON. EMS LOW TEMP LED lit.	Ambient temperature is below low temperature set point Input I3.	Lower "Low temperature" set point, or disable switch SW4.

Continued...

Continued... None of the heaters turn on	Dispatch requested. LOGO Input 4 on. Indication Output Q1 on.	Dispatch run time expired.	Re request from dispatcher.
	Dispatch requested. LOGO Input 4 on. Input I 3 on. Indication Output Q1 on.	Low temp function is on Input 3 LOGO	Turn function off SW4 switch bracket Lower low temp set point on the EMS.
	Timed manual button pressed.	Time expired.	Press again.
	Timed manual button pressed. Relay1 on relay board on. EMS Low temp LED lit.	Low temp function on.	Lower set point or disable function with SW4 on switch bracket. Not recommended on propane fired heaters.
	Test button SW1 pressed on switch bracket. LOGO display lit.	Heater power disconnected. Selector switches turned off.	Turn power on, Turn selector switch to remote.
Some of the heaters do not turn on	Heaters requested. Only two heaters turn on, all others off.	Software switches B18 to B21 turned off.	Turn the desired heaters on, B19 to B21.
	Test button pressed on switch bracket. Only two heaters turn on.	Software switches B13 to B16 turned off.	Turn the desired heaters on, B13 to B16.
	LOGO indicates ALARM. Output Q2 on.	Heater(s) in ALARM.	Correct heater failure Reset heater(s)

**YOUR LOCAL DISTRIBUTOR IS.....**



2793 Fenton Road  
Ottawa, Ontario, Canada K1T 3T9  
Phone: (613) 822-1765  
Fax: (613) 822-1556 [www.hovey.ca](http://www.hovey.ca)