

FIG. 2—FEATURE LOCATIONS.

## OPERATION

### CONTROL ALGORITHM On/Off Control

The T775A operates with one (1) temperature input supplied by the remote sensor, while the T775B has two (2) temperature inputs. The T775A and B are capable of providing up to four (4) stages of relay outputs for on/off control. Each stage of the T775A and B has its own independent set point which can be configured to operate in either the Cooling or Heating mode. The mode of operation for each stage is user determined by the programming keys.

### Heating Mode Operation

- Relay outputs are energized at set point minus differential.
- Relay outputs are de-energized at set point.

### Cooling Mode Operation

- Relay outputs are energized at set point plus differential.
- Relay outputs are de-energized at set point.

### EXAMPLE:

Using a device with one input and one relay output, the corresponding load would be energized at the following temperatures based on the initial settings.

### Settings

- Set point: 68° F
- Differential: 2° F

### Outputs Energized

### Heating Mode:

- Stage One: Energized at 66° F

### Cooling Mode:

- Stage One: Energized at 70° F

The T775B has dual sensor inputs and allows two separate controllers to exist within one enclosure. Selection of the stage parameters (operation mode, set points, and differentials) is the same as that for a single sensor device once each stage has been assigned to its operating sensor. This assignment is hardware driven via a four position DIP switch. An explanation of the DIP switch assignments appears in Fig. 3 (see Fig. 2 for the DIP switch location).

### Contact Closure Override input

A two-terminal input is provided to allow the user to override a relay energized condition on all outputs by using a contact closure between terminal pins 3 and 4 of the terminal block for sensor input shown in Fig. 2. This can be achieved manually or by using an EMS controller or time clock with normally open contacts, i.e., W7505, S7005, etc.

When this override is active, the display will show the numbers of the stages that would have been energized and the words "STAGE ENERGIZED" will flash.

### F°/C selection

A single jumper plug controls °F/°C indication of the displayed temperature value. The location of this jumper is shown in Fig. 2. The unit is shipped with the jumper installed in the °F mode. To operate the device in °C mode, remove the jumper.

### DIP Switch Selections

On the T775B, DIP switches are provided for assignment of each relay output stage to its operating sensor. If an individual switch is depressed toward its corresponding load number (1-4 on DIP switch) or to the right, Sensor B

will be the controlling sensor for that output stage. If an individual stitch is depressed to the left, Sensor A will be the controlling sensor for the output stage. An example of the switches and their corresponding positioning is shown in Fig. 3.

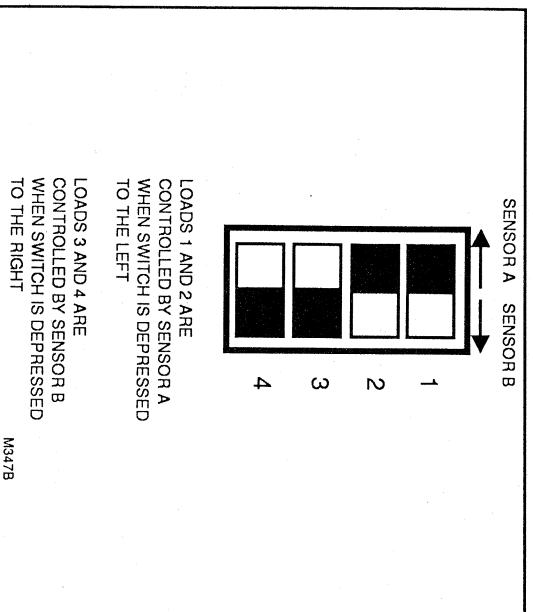


FIG. 3—DIP SWITCH SETTINGS FOR SENSOR SELECTION.

### KEYPAD PROGRAMMING AND DISPLAY

The T775 utilizes a Liquid Crystal Display for interactive prompting during programming and display of sensed and assigned set point and differential values. User programming of the T775 is accomplished through the use of four programming keys.

#### Programming Keys

The four programming keys are the Select, Up arrow, Down arrow, and Enter keys.

- Select key sequentially prompts the user as to what parameter is being displayed: set point, differential, stage energized, heat or cool (operation mode), 1,2,3,4 (indicating assigned stage). Once the last parameter value has been viewed, pressing the Select key will display the control values again from the beginning of the display loop.
- Up and Down arrow keys allow the displayed parameter to be increased or decreased. After pressing the Select key, a control value can be changed by using the arrow keys. Control values will be increased or decreased by 1° F or 1° C each time the arrow keys are depressed.
- Enter key places the new value into the memory of the microprocessor.

#### IMPORTANT

A control value or operation will not be entered in the memory of the microprocessor until the Enter key is pressed.

- Control values and operation selection will remain in the device memory even after power is removed.
- Simultaneously pressing the Select and Enter keys is required to change the control algorithm from heating to cooling or from cooling to heating. These parameters (heat and cool) are not displayed during normal Select key sequences. The only parameters displayed after pressing the Select and Enter keys at the same time will be stage indication and the word "heat" or "cool". To change the operation from heating to cooling or vice versa for a desired output

stage, use of the arrow keys is required. Once the mode has been changed, depression of the Enter key is necessary to enter this change into the microprocessor memory. The next stage of heat or cool assignment will appear after the select key is pressed. When all stages have been programmed, the display will revert back to sensed temperature and load energized status.

#### Display

Once power is applied or restored to the device, the display will countdown from 210 until the display reads zero, during which time any previously energized outputs will be de-energized. This is intended to protect compressors in the event of a power outage.

To avoid viewing this entire countdown, press the Select key. The LCD display will now show what it normally reads: load (sensed) temperature, stages energized, and which sensor (sensor A or sensor B) is being read for two sensor devices. At any time during the programming procedure, the display will revert back to showing the sensed temperature and stage status indication 60 seconds after the last key closure.

For two sensor applications, the user has three options as to what is displayed. The display can be configured to alternately indicate "sensor A" and "sensor B" sensed temperature at a 5 second rate or lock on to sensor A or sensor B sensed temperature continuously.

This selection is accomplished by stopping at "sensor A" or "sensor B" sensed temperature points in the Select key scrolling loop. To lock on to either sensor, the user must scroll the Select key through the loop to the sensed temperature prompt of interest. The display will stick to that parameter until the Select key is activated to advance the loop. When the loop is stopped at any other prompt, the display will alternately indicate "sensor A" and "sensor B" sensed temperature after 60 seconds from the last key closure or immediately after the Select key has been pressed at the end of the programming sequence.

#### Error Messages

There are seven error messages that can be displayed in response to software or hardware problems with the T775. The error codes that may be seen flashing on the display are listed below:

##### SF—Sensor Failure

If the display shows a flashing SF, this indicates an out of range sensor. Determine if the sensor(s) are connected properly. For T775A, all loads will be de-energized when this error message is flashing.

For the T775B, the loads controlled by the out of range sensor will be de-energized. The display will flash "SF" to indicate which sensor is defective or in error. In the event that only one sensor is defective, the remaining sensor and it's load(s) will operate normally. Only the loads controlled by the defective or unconnected sensor will be de-energized.

##### EE—EEPROM Failure

The values read back from the EEPROM are not the same as what was written into the EEPROM. This error cannot be field repaired. Replace device. The EEPROM is not intended to be field repaired.

##### CF—Calibration Failure

A calibration resistor reading was not within the range of the Analog to Digital converter. This error cannot be field repaired. Replace device.

##### OF—Stray Interrupt failure

An unused interrupt occurred. This error cannot be field repaired. Replace device.

#### CE—Configuration Error

The device hardware has been configured to a non-existent device. This error cannot be field repaired. Replace device.

#### OE—ROM error

The internal ROM of the microprocessor is defective. This error cannot be field repaired. Replace device.

#### AE—RAM error

The internal RAM of the microprocessor is defective. This error cannot be field repaired. Replace device.

#### Set Point Calibration

To maintain temperature accuracy, sensor wires should be 18 AWG two-conductor. If the length of the sensor wire exceeds 400 ft, recalibration will be necessary to maintain accuracy. The chart below shows the corresponding temperature offset that should be used for different sensor wire lengths. This temperature offset should be added to the desired temperature set point for these applications. Refer to programming instructions for entering temperature set points in programming section.

#### SENSOR WIRE LENGTH CALIBRATION OFFSET

SENSOR WIRE LENGTH	CALIBRATION OFFSET
0-399 ft.	none required
400-599 ft.	1.0 degrees
600-799 ft.	2.0 degrees
800-1000 ft.	3.0 degrees

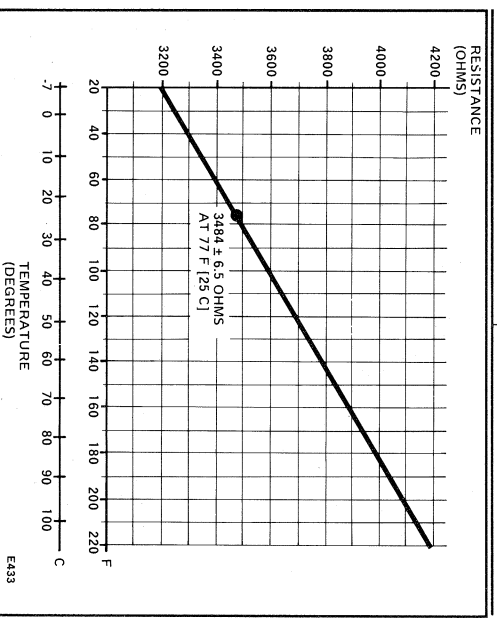


FIG. 4—RESISTANCE VS. TEMPERATURE PERFORMANCE CHARACTERISTICS.

#### DEVICE PROGRAMMING

1. For the T775B assign the loads to the appropriate sensor by setting the DIP switch in the upper right corner of the T775 (see DIP Switch Selection Fig. 3).
2. Before programming the T775 verify that the °F/°C selection jumper is properly installed. The T775 is shipped from the factory with the jumper installed in the °F position. If °C is desired the jumper should be removed.
3. Apply power to the device. The device will begin counting down from 210. This countdown sequence will last for approximately 3-1/2 minutes.
4. To override this time delay, press **Select**.
5. Press **Select** and **Enter** keys simultaneously to begin programming the load operating mode (Heat or Cool).

*The display will indicate Heat or Cool and the stage number.*

6. Press the **Set (Down Arrow)** to change to cooling. The **Set (Up Arrow)** will change back to heating.
7. Press **Enter** to program the displayed mode into memory.
8. Press **Select** to go to the next stage.
9. Repeat steps 6 thru 9 for additional stages.
10. Pressing **Select** after the last stage has been setup will return the sensed temperature.

#### PROGRAMMING STAGE CONTROL VALUES

1. Press **Select** to display the current stage set point.
2. Press **Set (Up Arrow)** to increase or **Set (Down Arrow)** to decrease to the desired set point.
3. Press **Enter** to enter the displayed value into memory.
4. Press **Select** to display the current stage switching differential.
5. Press **Set (Up Arrow)** to increase or **Set (Down Arrow)** to decrease to the desired switching differential.
6. Press **Enter** to enter the displayed value into memory.
7. Repeat steps 1 thru 6 to program each additional

8. For the T775A press **Select Select** (2 times) to return to stage 1 parameters. For the T775B press **Select Select Select Select** (4 times) to return to stage 1 parameters. Scroll through the programming loop a second time to confirm that the appropriate values have been entered into memory by pressing **Select**.

NOTE: The T775B has three options for displaying the sensed temperature.

1. Sensor "A" only
2. Sensor "B" only
3. Alternating between Sensor "A" and Sensor "B"

For the T775B only:

9. Press **Select** after viewing the switching differential for the final stage to display sensor "A" temperature only.
10. Press **Select** again to display sensor "B" temperature only.
11. Press **Select** again to alternate the display between sensor "A" temperature and sensor "B" temperature at approximately 5 second intervals.
12. Before replacing the cover on the T775 check to see that the control values have been recorded on the label on the backside of the cover.

NOTE: The control values programmed into memory will not be lost because of a power failure.

#### IMPORTANT

##### FOR THE T775As ONLY

After initial programming, altering the set point for stage 1 up or down will result in a change in set points 2, 3 and 4 by the same number of degrees and in the same direction. If increasing or decreasing the set point for stage 1 results in exceeding the control limits (-20° to +240° F) for subsequent stages, the control will not allow the user to enter a value for stage 1 higher or lower than this limit. This will allow for easy sequential output staging to be modified, while keeping the margin between set points intact.

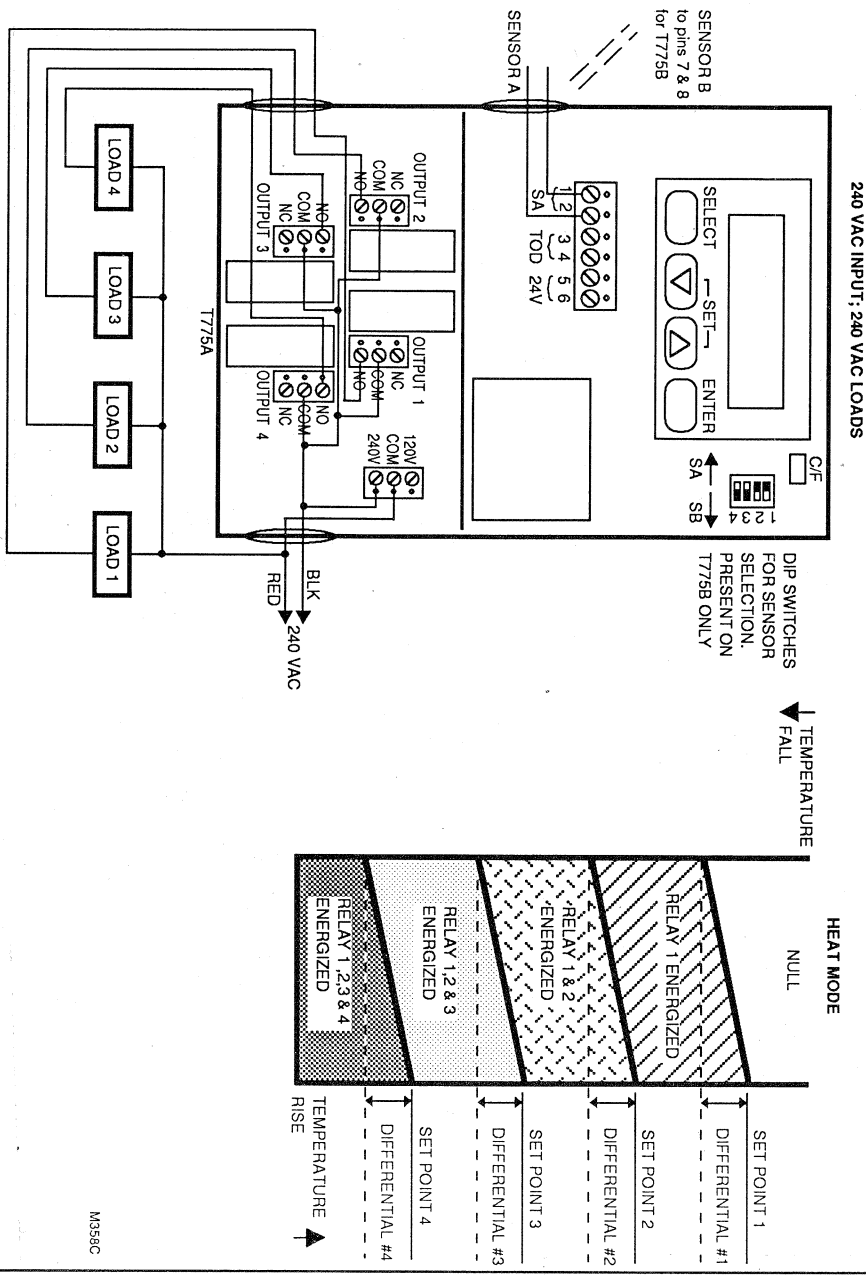
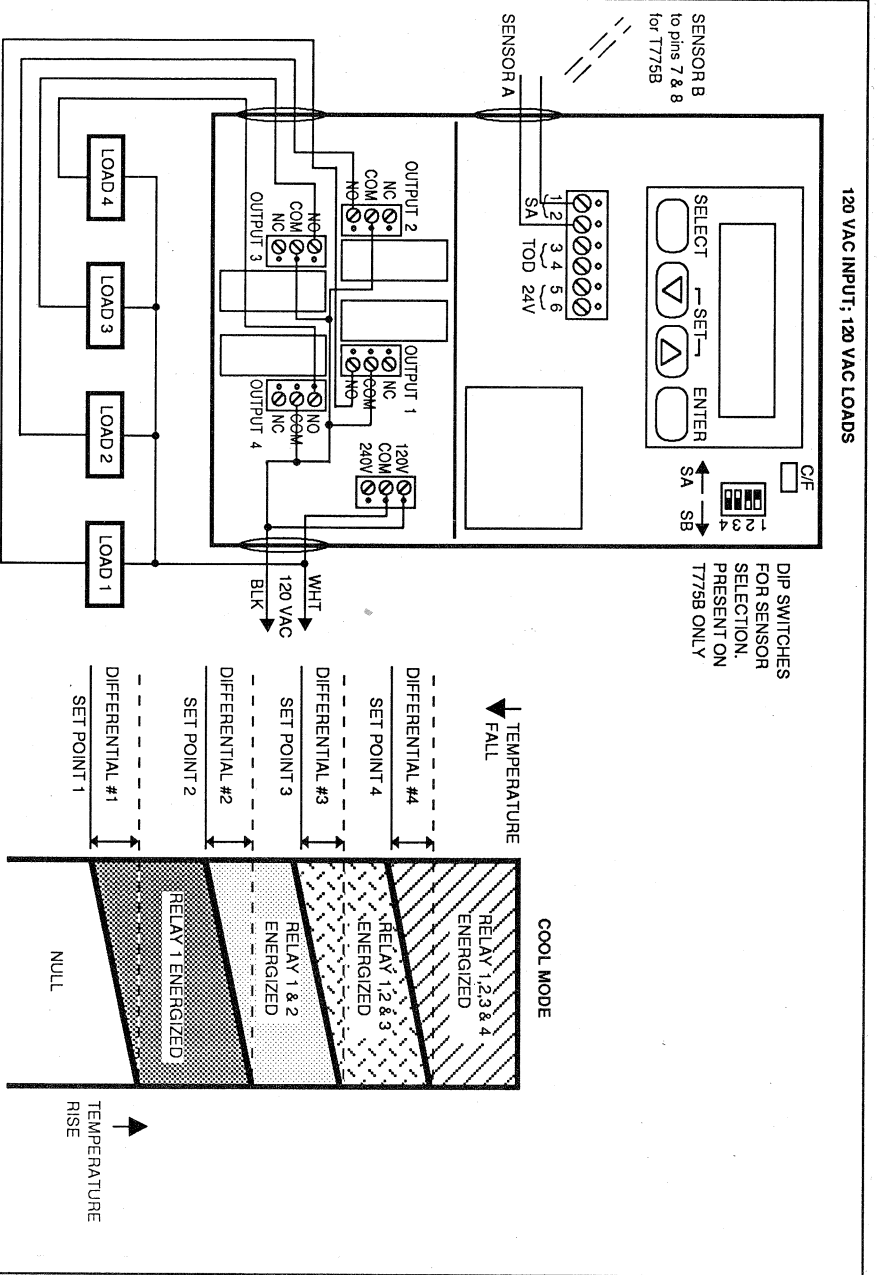


FIG. 10—FOUR-STAGE CONTROL, 120 OR 240 VAC INPUT, 120 OR 240 VAC LOAD.

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