HONEYWELL ELECTRIC HEATING SEQUENCE CONTROL SYSTEM

I - INTRODUCTION

The Honeywell series R8330 sequencers are used in several Lennox electric heating units. These heat relays switch the blower and electric elements on and off in sequence. Figure 1 shows the R8330 sequencer.

Several R8330 styles are used to vary the switching to the application. Table 1 identifies the various models and Figure 2 illustrates the corresponding switching. Note that the sequencers used by Lennox are marked by an asterisk.

At 120°F ambient there is a 10 second minimum between sequencer staging. All stages of an individual control cycle on within two minutes and off within four minutes at nominal voltage and ambient temperature. Table 2 lists the on and off sequencing for the controls used by Lennox.

II - TYPICAL OPERATION

Figure 3 explains a typical sequence of operation (ECH9-46-751 shown)

HONEYWELL R8330 ELECTRIC HEAT SEQUENCER

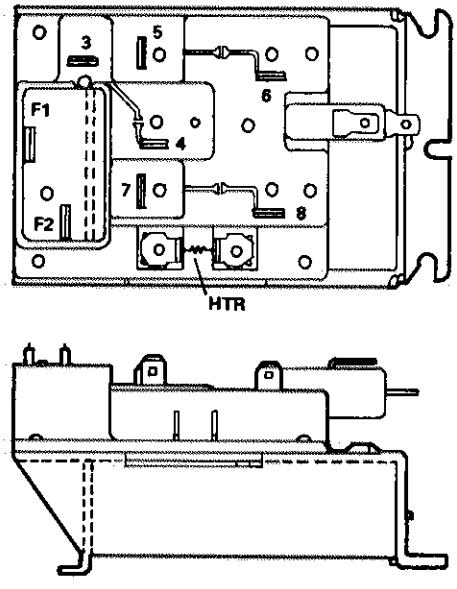


FIGURE 1

TABLE 1

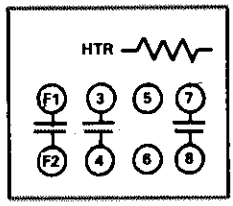
MODEL	ISOLATED FAN SWITCH (F1-F2)	LOAD SWITCH NO. 1 (3-4)	LOAD SWITCH NO. 2 (5-6)	LOAD SWITCH NO. 3 (7-8)	AUXILIARY SWITCH
*R8330A	X	X	—	X	—
*R8330B	X	X	X	X	—
*R8330C	X	X	—	X	X
*R8330D	X	X	X	X	X
R8330E	—	X	—	X	—
R8330F	—	X	X	X	—
R8330G	—	X	—	X	X
R8330H	—	X	X	X	X
*R8330J	X	X	—	—	—
R8330K	—	X	—	—	—

NOTE - An asterisk indicates a control used by Lennox.

TABLE 2

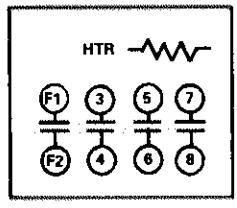
MODEL	ON SEQUENCE			OFF SEQUENCE		
	First	Second	Third	First	Second	Third
R8330A	(F1-F2) & (3-4)	(7-8)	----	(7-8)	(F1-F2) & (3-4)	----
R8330B	(F1-F2) & (3-4)	(5-6)	(7-8)	(7-8)	(5-6)	(F1-F2) & (3-4)
R8330C	(F1-F2) & (3-4)	(7-8) & (Aux.)	----	(7-8)	(Aux.), (F1-F2) & (3-4)	----
R8330D	(F1-F2) & (3-4)	(5-6)	(7-8)	(7-8)	(5-6)	(Aux.),(F1-F2) & (3-4)
R8330J	(F1-F2) & (3-4)	----	----	(F1-F2) & (3-4)	----	----

***R8330A**



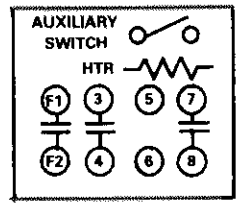
Three switch model sequences 2 elements and blower on and off. Fan interlock cycles blower on with first element and off with last element.

***R8330B**



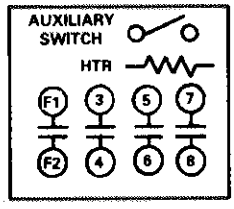
Four switch model sequences 3 elements and blower on and off. Fan interlock cycles blower on with first element and off with last element.

***R8330C**



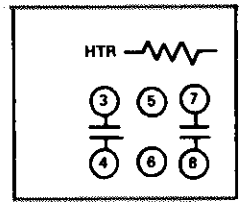
This control functions like the R8330A, but has an auxiliary switch to energize a second control.

***R8330D**



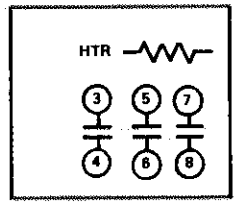
This control functions like the R8330B, but has an auxiliary switch to energize a second control.

R8330E



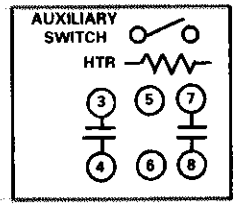
Two switch combination model sequences 2 elements and blower on and off. Blower and first element are controlled by first switch (terminals 3 and 4).

R8330F



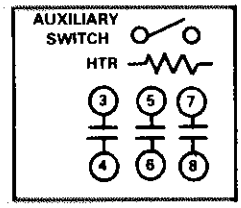
Three switch combination model sequences 3 elements and blower on and off. Blower and first element are controlled by first switch (terminals 3 and 4).

R8330G



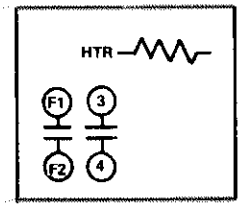
This control functions like the R8330E, but has an auxiliary switch to energize a second control.

R8330H



This control functions like the R8330F but has an auxiliary switch to energize a second control.

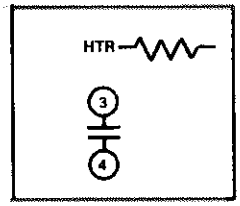
***R8330J**



Two switch model sequences one element and blower on and off. Fan interlock switches blower and element on and off simultaneously.

NOTE — An asterisk indicates a control used by Lennox.

R8330K



One switch combination model sequences one element and blower on and off.

FIGURE 2

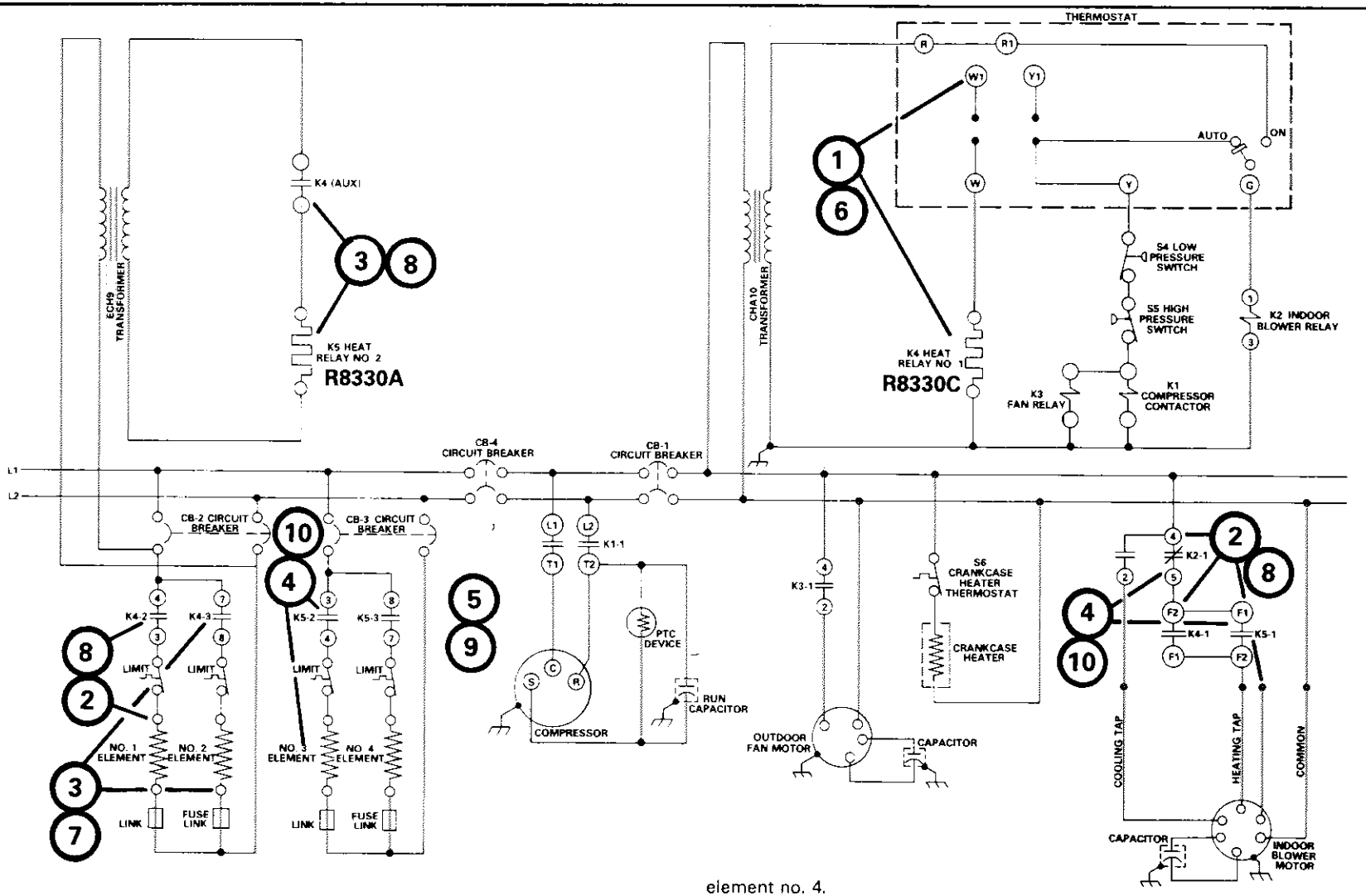


FIGURE 3

"ON" SEQUENCE

1 - On a heating demand, the K4 no. 1 heat relay (R8330C) is energized.

2 - In approximately 10 seconds, K4 closes its K4-1 isolated fan switch (F1-F2) and the K4-2 load switch (3-4) simultaneously. The blower motor will run at heating speed through N.C. K2-1. K4-2 powers element no. 1.

3 - In approximately another 10 seconds, K4 closes the K4-3 load switch (7-8) and the K4 auxiliary switch simultaneously. K4-3 powers element no. 2. The auxiliary switch energizes K5 no. 2 heat relay (R8330A).

NOTE - All K4 "on" switching is accomplished within two minutes from step 1.

4 - Approximately 10 seconds after step 3, K5 closes its K5-1 isolated fan switch (F1-F2) and the K5-2 load switch (3-4) simultaneously. The blower motor is locked in to the element demand. K5-2 powers element no. 3.

5 - In approximately another 10 seconds, K5-3 load switch (7-8) closes to power element no. 4.

NOTE - All K5 "on" switching will be made within two minutes after step 3.

"OFF" SEQUENCE

6 - As the demand is satisfied, the thermostat opens to de-energize K4.

7 - After a short delay, K4-3 contacts (7-8) open to de-energize the no. 2 element.

8 - After an additional delay, K4-1 contacts (F1-F2), K4-2 contacts (3-4) and the auxiliary switch all open. Element no. 1 is de-energized. The blower is held on by K5-1 contacts. The auxiliary switch de-energizes K5.

NOTE - All K4 "off" switching is done within four minutes after step 6.

9 - After another interval, K5-3 contacts (7-8) open to de-energize the no. 4 element.

10 - After a final delay, K5-1 contacts (F1-F2) and K5-2 contacts (3-4) both open. Element no. 3 and the blower motor are de-energized.

NOTE - All K5 "off" switching is done within four minutes after step 8.

III - TROUBLESHOOTING

1 - As a preliminary step, check system wiring for loose or broken connections. Make sure that blower and heating elements are operating properly.

2 - Check for 24 VAC at transformer secondary. If the voltage is within ± 10 percent, proceed to step 3. If the secondary voltage is not within this range, check that the transformer primary voltage is ± 10 percent of rated voltage. If correct replace transformer. If primary voltage is incorrect, correct source problems.

3 - Provide a heating demand at room thermostat. Jumper outdoor thermostat if used.
   a - If system does not start (after time delay), go to step 4.
   b - If blower and/or some elements start, but not all, proceed to step 5.
   c - If blower and heating elements all sequence on properly, go to step 6.

4 - Jumper R to W at thermostat. On heat pump applications jumper VR to Y.
   a - If blower and elements now operate (after time delay), check thermostat and wiring. Replace if necessary. Proceed to step 5.
   b - If neither blower or elements operate off of a control, replace the heat relay.

5 - Jumper across the heat relay contacts for the inoperative blower or element. If the blower or element now starts, the contacts are not making. Replace the heat relay.

6 - After all the elements and blower are on, lower the thermostat setting, to eliminate the heating demand. Check that heating relay breaks contacts according to Table 2. Allow time for all elements to sequence off. The blower should stay energized until the last stage turns off.