

THERM-O-DISC ELECTRIC HEATING SEQUENCE CONTROL SYSTEM

I - INTRODUCTION

Therm-o-disc series 15S sequencers are being used in some Lennox electric heating units such as the E12. These heat relays switch the blower and electric elements on and off. Figure 1 shows a 15S sequencer.

These sequences are voltage-compensated PTC (positive temperature coefficient) operated devices. The PTC heater provides direct heat input to a calibrated bimetal disc. The physical relationship between the PTC heater and bimetal disc is fixed. This snap action disc operates an electric switch.

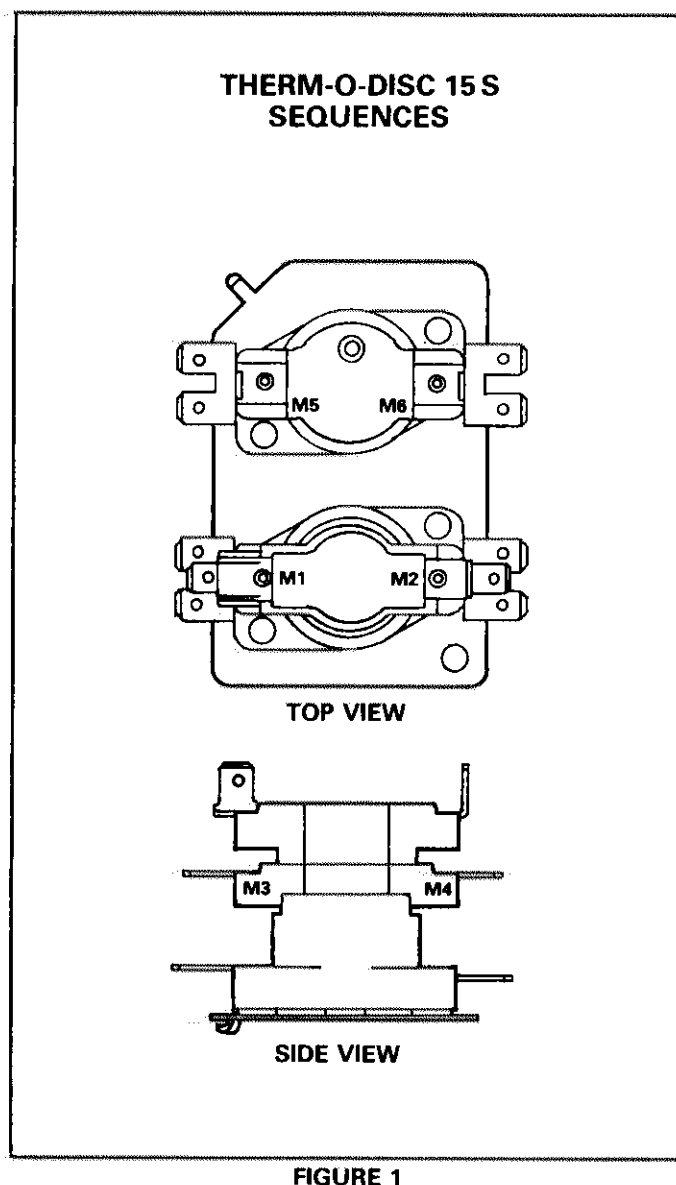
On a heating demand the PTC heater is energized and it provides direct controlled heat input to the bimetal disc. This controlled heat input, coupled with controlled disc calibration, provides the switch timing. When the heating demand is satisfied, the PTC heater is de-energized and the disc calibration determines the off sequence.

Several 15S style sequencers are available for the various switching requirements. Actually the 15S heat relay is composed of a combination of 12S and/or 14S sequencers. The 12S has a single bimetal disc device with a single timing and either a SPST or DPST switch. The 14S has two bimetal discs with two separate timings and two SPST switches. Figure 2 shows the current 15S sequencers with corresponding Lennox part numbers being used. Figure 2 also gives the sequencer timing and the class identification.

All 15S sequencers are timed so the first set of contacts (M1-M2) turn on first and turn off last under all operating conditions. The class designation identifies the other switch sequencing. Class D heat relays are sequenced on and are random off. Class E heat relays are random on and random off.

II - TYPICAL OPERATION

Figure 3 explains a typical sequence of operation (E12Q5-30-2P shown).



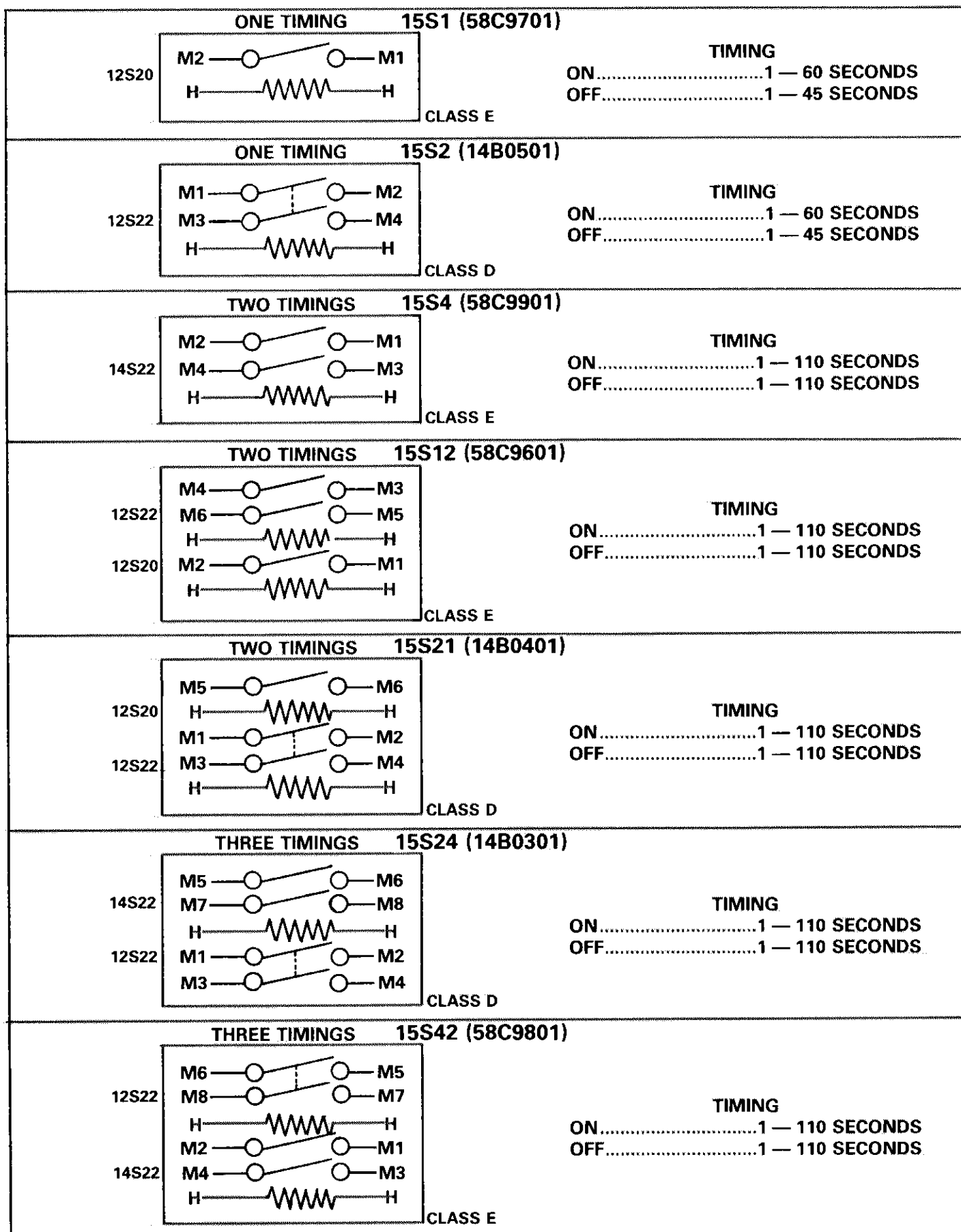
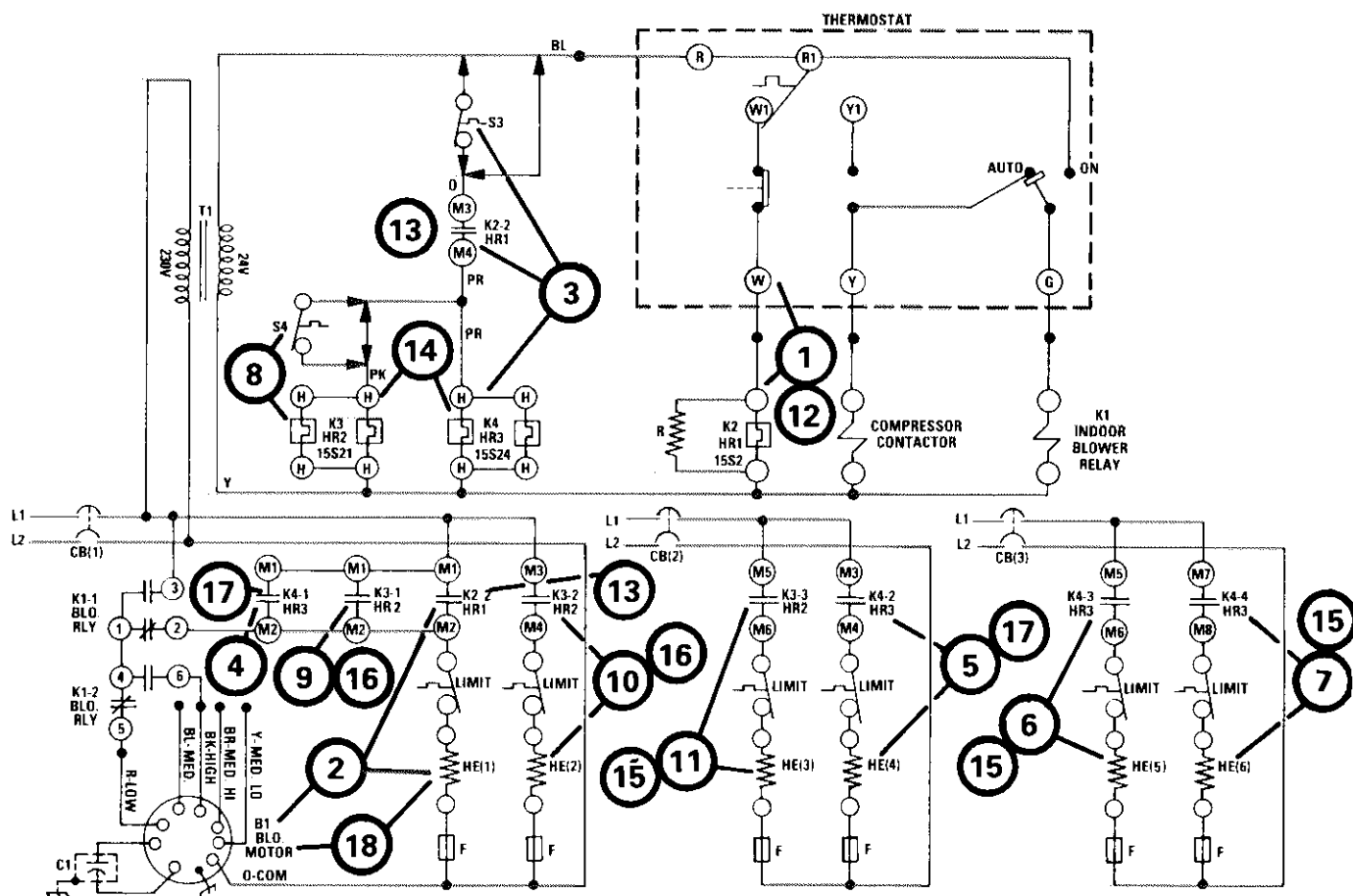


FIGURE 2



- 1 - On a heating demand, K2 Heat Relay No. 1 (15S2) is energized.
Within 1 — 60 seconds, K2-1 and K2-2 switches make together.
 - 2 - K2-1 contacts close to energize the blower motor on heating speed through N.C. K1 contacts. K2-1 also powers the first heating element.
 - 3 - If the optional outdoor thermostat (S3) is made, K2-2 energizes K4 Heat Relay No. 3 (15S24). Both K4 heaters are energized simultaneously. K4-1 (terminals M1 — M2) and K4-2 (terminals M3 — M4) switches are the first to make.
 - 4 - K4-1 locks in blower operation to element demand.
 - 5 - K4-2 powers element number 4.
 - 6 - K4-3 (terminals M5 — M6) contacts next make to power element number 5.
 - 7 - K4-4 (terminals M7 — M8) contacts next make to power element number 6.
- NOTE — All K4 switching is accomplished within 1 — 110 seconds.
- 8 - If the optional outdoor thermostat (S4) is made, K2-2 also energizes K3 Heat Relay No. 2 (15S21) in step 3. Both K3 heaters are energized simultaneously. K3-1 (terminals M1 — M2) and K3-2 (terminals M3 — M4) switches are the

first to make.

- 9 - K3-1 locks in blower operation to element demand.
 - 10 - K3-2 powers element number 2.
 - 11 - K3-3 (terminals M5 — M6) contacts next make to power element number 3.
- NOTE - All K3 switching is accomplished within 1 — 110 seconds.
- 12 - When the heating demand is satisfied, the thermostat opens to de-energize K2.
 - 13 - Within 45 seconds K2-1 and K2-2 switches open together. Element 1 remains energized through K4-1 and K3-1.
 - 14 - When K2-2 opens, both K4 and K3 heaters are de-energized simultaneously.
 - 15 - K3-3, K4-3 and K4-4 switches open at random to de-energize elements numbers 3, 5 and 6.
 - 16 - Switches K3-1 and K3-2 break together. Element number 2 is de-energized.
 - 17 - Switches K4-1 and K4-2 break together. Element number 4 is de-energized.
- NOTE — All K3 and K4 switches open within 1 — 110 seconds.
- 18 - When K3-1 and K4-1 contacts are both closed, the blower motor and element number 1 are de-energized.

FIGURE 3