Servicing U-Line undercounter combination units

by Jim Johnson

Undercounter refrigerator repairs are among the simplest tasks for an appliance service technician. Basically, the unit is a compact conventional refrigerator with nothing more than a simple thermostat for temperature control of a fundamental refrigeration system. And undercounter icemakers — since that’s all they do is make ice — are also simple and straightforward when it comes to operating temperatures and refrigeration systems. However, when you put the two systems together in the form of an undercounter combination unit that makes ice, and also has a fresh food and beverage section, there is more to understand about both the refrigeration and electrical systems. Figure 1 illustrates an example of this type of unit.

In this case, we’re showing a U-Line model CLRCO2075, which employs a simple plate-type evaporator on the left side to maintain a 40°F cabinet temperature, and also has an ice-making section on the right. The ice-making process is not accomplished by an ejector mold-type icemaker as you would typically find in a standard refrigerator/freezer. Instead, it’s a clear ice-making system that cascades a flow of water over a chilled ice mold, which is mounted vertically. As a result of this ice-making method, the cubes will have dimples on one side (see Figure 2).

What is shown here is a section of a slab of ice that falls off the vertical mold. We’re also showing the ice bridge that is another natural characteristic of this type of ice manufacturing. When the bridge is the correct thickness, the cubes separate when they fall into the storage bin. The ice cube thickness control, which can be adjusted if necessary, has a factory setting that should yield a cube with a dimple that is approx. 1/4- to 1/2-inch deep, and an ice bridge that is no more than 1/8-inch thick. Figure 3 shows an example of what the cubes should look like if the unit is operating properly.

The refrigeration system employs a standard capillary tube metering device, and three solenoid valves to accomplish the necessary modes of operation. With a Hot Gas Bypass Valve, a Refrigeration Valve for the refrigerator evaporator, and a Refrigeration Bypass Valve, the system is...
capable of making ice and providing refrigerant flow simultaneously for the refrigerator evaporator, or it will make ice only, or also provide flow only to the refrigerator section. The Hot Gas Bypass Valve allows the ice harvest to take place by warming the ice maker evaporator. In Figure 4, the refrigeration system is shown in operation, providing refrigerant flow for both evaporators. When you follow from the discharge line, on through the condenser and dryer, you can see that the refrigerant is metered initially into the ice maker evaporator, and subsequently into the refrigerator evaporator.

From a control system perspective, the unit’s bin sensor (thermistor) is calling for ice and the refrigerator sensor is calling for cooling. There is also a liquid line sensor that determines the length of the ice making cycle during the manufacturing of ice, and it also controls the length of the harvest cycle. This illustration also shows what’s happening with the water system. While there is sufficient water in the holding tank and no water is being brought in through the water supply system, the water circulating pump is on. At the point the bin sensor is satisfied and the system is no longer calling for the manufacture of ice, the water circulating pump would be turned off. The pattern of refrigerant flow through the ice maker evaporator would remain the same. In the event that the refrigerator sensor is no longer calling for cooling, but the bin sensor is calling for ice, the refrigerant flow will be as shown in Figure 5.

In this case, you can see that the water circulating pump is on, and the position of the refrigerator evaporator valves has changed. With the Refrigeration Bypass valve open and the Refrigeration Valve closed, there is no refrigerant flow through the refrigerator evaporator.

When the system has achieved ice production, the path of refrigerant flow will change to accomplish the harvest mode. In Figure 6, the control system has turned off the water circulation pump and the condenser fan motor, while the Hot Gas Bypass Valve has been opened, allowing the discharge from the compressor to flow
directly through the ice maker evaporator. In this mode, there is no refrigeration possible in the refrigerator section of the unit.

The control board for this equipment allows for both the operating voltage connections for the various components — refrigeration system solenoid valves, water inlet valve, circulating pump, compressor and condenser fan — along with the three control thermistor connections and the ice thickness adjustment (see Figure 7).

The operating components in this equipment can be energized separately, thus verifying their operation. The specific diagnostic mode entry steps for this particular model are as follows:

- Turn the power switch off and disconnect the power supply.
- Turn ice thickness adjustment dial to the +5 setting.
- Install a jumper at thermistor pins 9 and 10.
- Disconnect one pink lead from the circuit board.
- Reconnect the power supply and proceed with specific tests listed on the tech sheet.

The temperature controller, which consists of an LED display and touchpad buttons is also part of the diagnostic procedure when evaluating and troubleshooting this equipment. The display consists of three LED indicators, two of which will show the set-point of the refrigerator temperature. The third LED position, which is indicated in Figure 8, won’t show a number until a touchpad is pressed.

In this case, pressing and releasing the “Warmer” touchpad will allow the #1 LED to come on and momentarily show the actual refrigerator temperature. Pressing and releasing the “Colder” touchpad will allow LED #2 to momentarily show the liquid line temperature, and touching and holding the “Colder” touchpad will allow the #3 LED to show the ice bin temperature momentarily. As for the error codes on this display, #2 LED flashing indicates an open thermistor, and the #3 LED flashing indicates a drain line problem.