HOSHIZAKI TECHNICAL SUPPORT
TECH -TIPS

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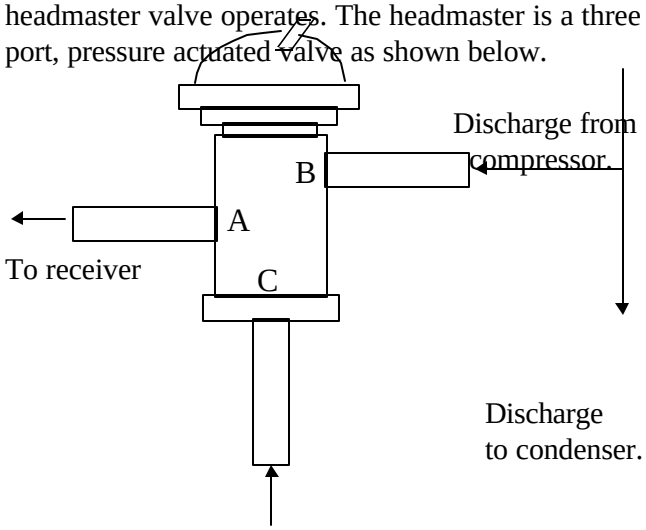
HEAD MASTER DIAGNOSIS by: Duncan Sheridan
Question: I suspect the headmaster valve is malfunctioning. How do I confirm this?

The first consideration is to understand how the condenser pressure regulating valve (CPR) or headmaster valve operates. The headmaster is a three port, pressure actuated valve as shown below.



From condenser outlet

The headmaster will direct the flow of either discharge gas or liquid refrigerant to the receiver. The valve can throttle or modulate open and closed to maintain proper high side receiver pressure. This throttling action allows the system to maintain a solid column of liquid refrigerant to the TXV refrigerant control.

The valve has a dome that is charged with an inert gas which is usually either nitrogen or air. The pressure of the dome gas pushes against a diaphragm that operates a pin to shift valve open or closed. The headmaster pressure setting will vary depending on the system requirements. The valves used on Hoshizaki ice machines maintain high side pressures of either 190, 156, or 140 PSIG depending on the model. If headmaster replacement

is necessary, always use a replacement headmaster valve with the correct pressure setting.

Here are some headmaster tips for low ambient operation.

* Low head pressure during the freeze cycle.

POSSIBLE CAUSE	**REMEDY**
Valve unable to close "C" port:	
a. Dome charge not present.	a. Replace valve.
b. Low system refrigerant charge.	b. Recover & weigh nameplate charge.
c. Foreign material stuck between "C" seat and seat disc.	c. Artificially raise head pressure and tap valve body to dislodge blockage.

* System runs high head pressure, ice maker cycles on high pressure safety.

POSSIBLE CAUSE	**REMEDY**
a. "B" port open due to foreign material between seat and seat disc.	a. Artificially reduce head pressure and tap valve body to dislodge blockage.
b. Excess refrigerant charge or air in system.	b. Recover refrigerant, evacuate & weigh nameplate charge.

For headmaster operation in higher ambient conditions, 70° F or above, the following applies. If the system is running low head pressure, recover the refrigerant, leak check the system, and re-charge to nameplate specs. If the system is running high head pressure, and the liquid line is the same temperature as the discharge line, the valve is by-passing to the receiver. This valve must be replaced.

Always use caution when replacing the headmaster. The valve body should not exceed 250° F while brazing. Use a heat paste or a damp cloth to wrap the valve body to protect the headmaster from overheating. Replace the drier and leak check the system prior to recharging to nameplate specs.

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POLYOL ESTER OILS

Polyol ester oil (POE also called "polyol" or "ester") is a synthetic lubricant designed for use with most any of the commonly available single component or blend refrigerants. It is important to note that POE is **required** when using an HFC refrigerant. You will find POE oil in any Hoshizaki unit using R-404A or R-134A refrigerant.

POE oils are very **hygroscopic**; which means they absorb moisture easily. Care must be taken when handling POE oils or accessing an HFC system to prevent exposure to air, moisture, or high humidity. Different refrigerant driers are also necessary in systems using synthetic oils.

Also important, is the fact that POE oils do not mix with other type lubricants. Lubricant manufacturers suggest that no more than a **. 5%** mixture is acceptable. Care must be taken not to introduce mineral oil or Alkylbenzene oil into a POE oil system. A separate gauge manifold, hoses, and a clean recovery system using POE oil are recommended when servicing a POE oil system.

SERVICE Q & A

Question; What do I check if I am servicing a unit with an "E" control board installed and it is beeping 2 beeps every 3 seconds.

Answer by: ***Keith Johnson***. In this case, access the control box and you will find the orange LED marked 20 min. illuminated. By checking the control board instructions label supplied with the board it can be determined that the unit has run two consecutive 20 min. harvest cycles.

Before the problem can be determined, the control board must be reset. This can be accomplished by leaving power applied to the unit and depressing the white reset button in the corner of the board. The unit should now start in the one minute fill cycle and be followed by the initial harvest cycle which will last 20 minutes. A basic check of this harvest cycle should narrow down the possibilities which would cause a 20 min harvest cycle.

When the compressor starts, touch the discharge line and the inlet and outlet of the hot gas valve. This will indicate that the hot gas valve is opening, and that the discharge vapor is hot enough for a timely harvest. If the outlet of the valve is cooler than normal, the hot gas valve did not open or is not opening enough to allow full hot gas flow. If the hot gas valve does not open at all, a remote unit will pull down in a vacuum because the liquid line solenoid is closed in harvest. On smaller water-cooled units the suction pressure will be close to that of a normal freeze cycle. The high condenser pressure opens the water regulating valve condensing the refrigerant and allowing refrigerant flow to the TEV. The evaporator will frost and the suction line temperature will never reach 48 degrees. In either case the suction line temperature never reaching 48 degrees will cause a 20 min. harvest cycle. A voltmeter should now be used to check for 115 volts to the hot gas solenoid coil. If 115 volts is present the coil is open or the valve body is stuck closed. If no voltage is present the board is defective.

If the suction line temperature reaches 48 degrees check the resistance of the thermistor. An open thermistor will result in a consistent 20 minute harvest. The open thermistor will need to be replaced. Take care to mount the thermistor properly. The normal resistance of the thermistor should correspond with the thermistor resistance chart provided in the Tech Specs pocket guide.

Another possible cause is the TXV, or liquid line solenoid leaking during the harvest cycle. If the TXV sensing bulb is not secured on the suction line or if refrigerant is exiting the expansion valve for any reason, it can cool off the discharge vapor and cause an extended harvest cycles. Check sensing bulb mounting and the operation of the TXV in the freeze cycle by using normal diagnostic procedures.

Refrigerant charge and compressor capacity is always a question on long harvest cycles. If unit charge is in question refer to the Tech-Specs pocket guide for normal operating pressures and cycle times. An inefficient compressor is probably the most difficult to troubleshoot. Generally if a compressor is inefficient, suction pressure will be higher than normal, discharge pressure will be

lower than normal, discharge vapor will be cooler than normal and compressor amp draw will be lower than the RLA. Use normal diagnostic procedures to determine a weak compressor.

After checking these items , you should be able to resolve the 20 minute harvest cycle shut down and resume proper KM ice production.

COMING NEXT MONTH...

1. Remote Connections For R-404A
2. F-1000 Gear Motor Change
3. Service Q & A