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Feature Article – QUEST Power-Saving Mode

Carrier Transicold offers a power saving option called QUEST. QUEST is a method of temperature control during steady-state perishable cooling that intelligently cycles the compressor on and off based on air temperature limits. In doing so, it reduces the cooling energy consumption while also reducing CO₂ emissions related to that power consumption.

In conjunction with the compressor cycling, the evaporator fans will cycle between high and low speeds. The fans will run on low speed when the compressor is cycled off and high speed when the compressor is cycled on.

The QUEST option is a model number configurable-only option. If configured, it can be enabled or disabled by selecting code 50, pressing the arrow “UP” or “DOWN” keys to select “OFF” or “ON” and pressing “ENTER”.

Also, depending on the model number, the unit is configured either default “OFF” or “ON”. If the controller is configured with a default setting “ON”, it will reset the code select 50 option to “ON” after every pretrip or trip start. If default is set to “OFF” the controller will reset code select 50 to “OFF” after pretrip or trip start.

When QUEST is active (“ON”), code select 50 will display one of the following conditions:

- “ON”
- “PULL” = suspended by pulldown.
- “SEtPt” = suspended by setpoint outside the range.
- “CAHUM” = suspended by CA or humidity control.
- “ACT” = suspended by ACT active.
- “FAIL” = return temperature probe failure.

The cycling of the compressor with perishable setpoints is new for the NT. Check to see if QUEST Logic is active prior to troubleshooting.

■ Mark Donahoe



Please circulate this newsletter to all of your support personnel

Feature Article – Enhanced Automated Fresh Air (eAutoFresh™) On-Demand Ventilation

Carrier Transicold offers an option called eAutoFresh™ which is an on-demand ventilation fresh-air exchange system. Traditionally, the fresh air vent was set to a manual position to prevent the build-up of damaging levels of CO₂ and Ethylene within the container during the voyage. But often, the vents were opened too wide and overcompensated for these concerns. The vent being open too wide resulted in an additional refrigeration load on the unit which unnecessarily increased the unit's power consumption while extending temperature pulldowns. The eAutoFresh™ system utilizes a CO₂ sensor which controls a stepper motor to open and close the fresh air makeup vent to maintain selected O₂ or CO₂ values. The controller will monitor and record the O₂ and CO₂ readings.



The following modes of operation are selectable via code select 43: “OFF”, “USER”, “TEST”, “DELAY”, and “GASLIMIT”. Within the modes of operation are submenus that contain the operational parameters for their respective mode.

Modes of operation:

When setting any mode of operation, the entire process must be followed to ensure all parameters are set.

If the **OFF** mode is selected, it will disable all automatic venting operations. The eAutoFresh™ vent will be driven fully closed and the eAutoFresh™ opening set to 0 CMH in function code Cd44. This is the default mode anytime a frozen mode of operation has been selected. Whenever a frozen setpoint is selected, the current eAutoFresh™ setting will be saved. The vent position will be restored when a perishable setpoint is selected.

If the **USER** mode is selected, it provides a continual setting of the vent position. The flow rate can be accessed through the submenu if a perishable setpoint has been selected. To set the flow rate, press the “ENTER” key to activate the selection mode. When “FLO” appears in the left hand window, use the “UP” or “DOWN” arrow key to scroll to the desired opening. The range is from 0 to 220CMH (0 to 129CFM) in increments of 5 or 3 respectively. Press the “ENTER” key to set the value and begin operation.

If the **DELAY** mode is selected the operation of the eAutoFresh™ system will be delayed for a set amount of time. This allows time for the cargo to reach setpoint. In “DELAY” mode, the eAutoFresh™ vent will open to the stored (FLO) value when the return air temperature sensor is at or below setpoint plus the return offset value (rtn) or the delay time (tIM), whichever comes first. The eAutoFresh™ vent will fully close when the return air temperature sensor is greater than the setpoint plus the offset temperature (rtn).

To set the unit in “DELAY” mode scroll until “DELAY” appears in the left window, then press the “ENTER” key to activate the submenu. The first selection is the amount of time (tIM) for the delay. Select the amount of time for the delay by using the “UP” and “DOWN” arrow keys. The range is from 1 – 72 hours in 1 hour increments. Press the “ENTER” key to set the value and move to the “FLO” rate. Use the “UP” or “DOWN” arrow key to scroll to the desired “FLO” rate. The range is from 0 to 220CMH (0 to 129CFM) in increments of 5 or 3 respectively. Press the “ENTER” key to set the value and move to the return temperature offset. Use

the “UP” or “DOWN” arrow key to scroll to the desired “rtn” rate. The range of offset is from 0.6°C – 2.8°C (1.0°F – 5.0°F) in 0.1° increments. Press the “ENTER” key to set the value and begin operation.

If the **GAS LIMIT** (gASLM) mode and a perishable setpoint have been selected and a valid reading is detected from the carbon dioxide sensor, the microprocessor will monitor and limit the amount of carbon dioxide within the container by opening and closing the eAutoFresh™ vent. The eAutoFresh™ vent will open to the (FLO) setting once the unit has completed initial temperature pulldown or if the cargo temperature is within 5°C (9 °F) of setpoint and the carbon dioxide level has reached the max limit, or if the oxygen level has reached the lower limit. After the first 15 minutes of the eAutoFresh™ vent opening, the controller will again evaluate the level of CO₂ and/or O₂ levels. If the gas limit values are satisfied after the first 15 minutes, then the vent will close. If either gas limit has not been satisfied within 15 minutes, the air exchange vent will open in 10 CMH (5.9 CFM) increments every 15 minutes until both gas concentrations are satisfied. Once all limits are satisfied, the vent will return to the closed position. If conditions are not met with the door open 100% for 90 minutes, Alarm 29 will be activated.

To operate in **GAS LIMIT** mode, scroll until “gASLM” appears in the left window, then press the “ENTER” key to activate the submenu. The first selection is the maximum carbon dioxide (CO₂LM). Select the max level by using the “UP” and “DOWN” arrow keys. The range is from 0 to 19% in 1% increments. Press the “ENTER” key to set the value and move to the minimum oxygen level (O₂LM). The range is from 2 to 20% in 1% increments. Press the “ENTER” key to set the value and move to the “FLO” rate. Use the “UP” or “DOWN” arrow key to scroll to the desired “FLO” rate. The range is from 0 to 220CMH (0 to 129CFM) in increments of 5 or 3 respectively. Press the “ENTER” key to set the value and begin operation.

If **TEST** mode is selected, it allows the operator to test the movement of the mechanical door air vent and calibrate the carbon dioxide sensor. To operate in the “TEST” mode, enter the “TEST” mode and select either “tEST” or “CAL”.

tEST – The eAutoFresh™ door will open fully and then return to the closed position. The test will be observed visually by the operator to ensure proper operation of the eAutoFresh™ vent. After completion of the test, the unit will return to the previous mode of operation.

NOTE: It is recommended that the calibration procedure only be performed during pretrip or when the container has been fully vented.

CAL – When “CAL” mode is selected the display will flash “CAL”. The operator will hold the “ENTER” key for 5 seconds. The display will stop flashing and read “CAL” for 5 seconds. The microprocessor will read the CO₂ value and then compare that value to a known zero value. If the sensor is within the calibration parameter range, the microprocessor will determine the appropriate offset for the sensor. If the sensor is outside of this range (for example if the container is loaded or has a high level of CO₂), the controller will flash “NOCAL” for 5 seconds, then revert back to the previous mode of operation.

The new on-demand ventilation option is limited to perishables where the optimal combined CO₂ and O₂ range is 21%. For applications that require a combined CO₂ and O₂ level less than 21%, Carrier offers the Everfresh™ controlled-atmosphere system.

■ Mark Rogers

TechFact – Tier 4i Engine

Carrier Transicold has introduced the EPA Tier 4i (Interim) compliant generator sets starting with the February 2008 production. To meet the emissions regulation, Carrier has incorporated the new Kubota Tier 4i compliant engine in both the Undermount (UG) and Clip-On (RG) generator sets.

The external changes consist of the following :

- The elimination of the glow plugs and the incorporation of an inlet air heater.
- The intake heater is mounted to the inlet of the intake manifold, which is now rear facing (flywheel side instead of radiator side).
- A heavier flywheel with a new larger 2.5kW starter.
- An electronically controlled speed regulation governor system. This system is made up of a combination of an engine speed sensor and an electronic control module. The electronic control module is preprogrammed with the desired engine speed (1800 RPM), providing a constant engine speed. This type of speed control eliminates any need to adjust the engine throttle speed adjustment screws.



Internal changes consist of smaller diameter pistons with an increase of stroke length (~1/2 inch to maintain the displacement at 2.2 liters). This change in stroke also increased the deck height of the block.

The basic operation and starting procedure remains the same as previous versions of Carrier Gensets. The units still have a toggle switch used for preheat, but instead of preheating the combustion chamber, the preheat switch now engages the Air Intake Heater. The preheat period (still a manual operation) is still dependent upon the ambient temperatures. After preheating and starting the engine using the “START” switch, the air intake heater will remain energized for 3 minutes, after the release of the air intake heater switch. During this 3 minute heater “ON” period, the Amp meter in the control box will indicate a system discharge (40 amp draw) instead of showing a positive charge as with the previous style of units. On termination of the 3 minute heater “ON” period, the heater turns “OFF”, and the Amp meter will then indicate a positive charge to the battery.

As with previous models, Bio-Diesel of grade B5 or lower can be used. A rating higher than B5, if used, will void warranty.

Never use any type of engine starter spray with these units due to pre-ignition in the inlet manifold.

■ Gary Barkowski

TechTip – Software Update

The latest software release versions for the 69NT units are:

Scroll (ML2i/ML3) – 5340
Reciprocating Unit (ML2i / ML3) – 5140
Reciprocating Unit (ML2) – 1207
Controlled Atmosphere – 3112
DataLine – 1.7

DataBank – 0512

The software, except for DataLine, can be downloaded from Transcentral within the Carrier Transicold Website at <http://www.container.carrier.com/>. DataLine can only be upgraded from the site if you have an original copy.

Note, you should always receive permission from the end user prior to upgrading the unit.

TechFact – Container ID and Real Time Clock

In the past, it was possible to set the container ID and the RTC (Real Time Clock) only by using the Data-Reader or the DataLine program. There is now another possibility, using the ML2i/ML3 software card. Cards with software versions of 5137 (recip) or 5328 (scroll) or greater allow the Operator to program the controller using the software card. This feature was added due to unavailability of Data-Reader or a PC in the field and operating in adverse weather conditions.

When the Operators insert the software card in the controller, they can scroll through menu items and choose which process to run. The “SET UP” option will bring you to a submenu consisting of “RUN” “CONFIG”, “SET TIM”, and “SET ID”.

- The “UP” and “DOWN” arrow keys are used to scroll through menu items.
- The “ENTER” key runs an application or moves forward in the menu.
- “CODE SELECT” key will move you back in the menu.



Set Container ID:

1. Turn the power “OFF” and insert software programming card.
2. Turn unit power “ON”. Displays will show: **SEt UP**.
3. Press “ENTER” key once. Displays will show: run **COOnFG**.
4. Press the “UP” or “DOWN” arrow key until display reads: **SEt Id** and press “ENTER”.
5. Press the “UP” and “DOWN” arrows to scroll through the letters or numbers you want to enter and press “ENTER”.
 - a. Note 1: The character that you are modifying will always be on the right most position on the display.
 - b. Note 2: The “ENTER” key will enter a letter, shift the segment to the left, and bring up the next letter.
 - c. Note 3: The “CODE SELECT” key will act as a backspace and shift the letters to the right bringing you back to modify the previous letter.
 - d. Note 4: The first 4 letters are alpha characters and the last 7 are numeric.
6. Repeat step 5 until the full container ID has been entered.
7. When the container ID setup is completed, displays will show: **SEt Id**.
8. Turn unit power “OFF” and remove the software/programming card.
9. Turn power “ON”, display will show the **Id XXXXXXXX** (The last 7 numerical digits) on startup.

Set Date and Real Time Clock:

1. Turn the power “OFF” and insert software card.
2. Turn unit power “ON”. Display will show: **SEt UP**.
3. Press “ENTER” key once. Display will show: run **COOnFG**.
4. Press the “UP” or “DOWN” arrow key until display reads: **SEt tIM**.
 - a. Press “ENTER” key once. Display will show **XXXX XX-XX** (YYYY MM-DD). You will start off modifying the Day, Month, and then Year.
5. Press the “UP” and “DOWN” arrows to scroll through the numbers you want to enter for the Day, Month and Year pressing the “ENTER” key once for each selection.
6. After you press “ENTER” on the year you will then modify the Time (HH MM). Minutes first then Hour.
7. Press the “UP” and “DOWN” arrows to scroll through the numbers you want to enter for the Minutes and Hours and press the “ENTER” key once. Data and Time is completed. Turn power “OFF”.



■ Nadir Guenane

TechFact – Pretrip Startup

On pretrip startup, the following sequence of visual tests will occur:

- Numeric portion of container ID is displayed in format 'Id 12 34567' for about six seconds.
- Software revision number and container unit model number are displayed for about three seconds.
- Configuration database identifier CFMMYYDD is then displayed.
- RMU modem status is displayed.

With software versions 5140, 5340 and greater, software logic was implemented to detect the presence of the RMU module during the execution of pretrip. On the startup of the pretrip, the controller will check for a communication path with the RMU. During the test, an **rM** 'tESt' will display. On completion of the test, one of the following messages will display for three seconds.

	Left Display	Right Display
RMU present	rM	PreS_ (Present)
RMU not present	rM	nPreS (Not Present)

This is a visual confirmation test only and has no associated failure action. If an RMU is found in the unit at the initial inspection but results displayed is “nPreS” (not present), then the unit should be examined to determine cause of the failure to communicate. This test will add no time to the controllers pretrip and the results will not be included as part of the “pretrip” results menu.

■ Perry Hoover

TechFact – P5-10,11,12 (Humidity Sensor)

Pretrip test 5-0 was enhanced to include tests 5-10, 11 and 12 to perform a check on the Humidity sensor.

P5 - 10 – Humidity Sensor controller configuration verification test: This is a Pass/Fail test to confirm the accuracy of the configuration. If configuration is yes, proceed to test 5-11. If configuration is set to no then

the controller will look for a humidity sensor to assure that one has not installed.

Controller Configuration	Sensor Found	Test Results
No	No	Proceed to test P6-0
No	Yes	Fail (set configuration)

P5 -11 – Humidity sensor installation check: This test confirms that a humidity sensor is present with the controller configuration set at yes from test 5-10. It is a pass/fail test. Test passes if the controller senses a humidity sensor reading greater than 6%.

Controller Configuration	Sensor Found	Test Results
Yes	No	Fail (troubleshoot sensor)
Yes	Yes	Pass (proceed to 5-12)

P5 -12 – Humidity sensor out of range test: This is a Pass/Fail test. Sensor readings below 10% will result in a failed test. Pretrip test must pass 5-11 before this test is run.

■ Perry Hoover

TechFAQ – Heater Megohm Reading

In the TechLine edition volume 11 number 2 published in 2006, the article titled, “Heater Megohm Reading Procedure”, the following step should be added on completion of step 2c.

After powering the unit off in step three, the Technician should allow the temperature of the heater to return to ambient condition prior to megohming the heater.

■ David Whyte



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