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|  | <b>FILE IN ABS, 2SAM MANUAL(S)</b> |                      |
| <b>SERVICE BULLETIN</b>   | Supersedes: Nothing                | Form 155.17-M2 (SB3) |
| File with Form 155.17-M2  |                                    |                      |

**SUBJECT: MILLENNIUM CONTROL CENTER (YPC ABSORPTION UNITS) -  
EPROM VERSION A.01F.08**

On/About November 1996, YPC absorption units will be shipped with EPROM version A.01F.08 (P/N 031-01669-002). It supersedes version A.01F.07 and contains the following enhancements:

**LESLIE STEAM VALVE**

Previously, all steam units were equipped with **Honeywell** steam valves. The Honeywell valve is controlled by applying 115VAC from the Microcomputer Control Center relay board to the open or close valve terminals.

The subject EPROM provides for the use of **Leslie** steam valves. These valves are controlled by a 4-20ma signal from J3 of the microcomputer control I/O expansion board. This output is enabled when I/O expansion board program jumper JP2 is cut.

**OPERATION**

There is no position feedback potentiometer. Therefore, the steam valve calibration procedure that is required for the Honeywell valve, is not required for the Leslie valve. The fully closed position will be displayed as 0% and the fully open position as 100%. During unit run, the valve is modulated between 20% and 100% of unit capacity to control the leaving chilled water temperature (LCWT) to the leaving chilled water temp setpoint. The valve position that corresponds to the 20% of unit capacity operating point is determined by a field procedure performed by the field service technician (ref YORK Form 155.17-NM1). This valve position is then programmed as the **minimum allowed loading** setpoint (5-60%) by the field service technician using the procedure below.

During unit run, the position of the steam valve is changed, as required, at the end of each sample/output interval. Each time the unit is started, the sample/output interval is 1 minute long until the steam valve position is greater than or equal to 50% or the leaving chilled water temperature (LCWT) decreases to within 5°F of the LCWT setpoint. After that, the sample/output interval is 0.5 to 16 minutes, as programmed in the **sample factor** setpoint below. Other programmable setpoints, as detailed below, affect the amount of valve

position change that occurs at the end of each sample/output interval. For example, if the unit is used in an application where loads are shed quickly and fast unloading is required, the **unload** setpoint can be used to make the unit unload faster. If the unit is constantly used under light load conditions, the **DAC Divide Value** setpoint can be used to decrease the amount of change in valve position that would normally occur at the end of each sample/output interval. The **rate limit** setpoint determines the response sensitivity to the LCWT rate of change within the sample/output interval. These setpoints are detailed below.

**PROGRAMMABLE SETPOINTS**

The following field programmable variables allow the field service technician to fine tune the valve control to local site conditions.

- 1.) **Minimum Allowed Loading** – Programmable from 5% to 60% in 1% increments. Typically set at 20% of unit capacity. Operating below this capacity will result in unstable operation. During unit run, the steam valve will not be allowed to unload below the programmed steam valve position. However, using the load/unload keypad keys in **service** mode, will allow the service technician to unload below this position.

To assure that the unit will not unload to less than the **minimum allowed loading** setpoint position, the following safeguards are in place:

If a remote device attempts to limit the loading to a valve position that is less than the "MINIMUM ALLOWED LOADING" setpoint, the Microcomputer Control Center will override the remote device as follows: if a **remote load limit** setpoint is received that is not greater than the "MINIMUM ALLOWED LOADING" setpoint, the program will automatically set the "REMOTE LOAD LIMIT" setpoint to 1% above the "MINIMUM ALLOWED LOADING" setpoint.

Similarly, the program will assure that the "MAXIMUM ALLOWED LOADING" setpoint is set to a value greater than the "MINIMUM ALLOWED LOADING" setpoint. If a service technician attempts to enter a "MAXIMUM ALLOWED LOADING" setpoint that is not greater than the "MINIMUM ALLOWED LOADING" setpoint, or a "MINIMUM ALLOWED LOADING" setpoint that is not less than the "MAXIMUM ALLOWED LOADING" setpoint, "OUT OF RANGE - TRY AGAIN" is displayed.

- 2.) **Unload** – Programmable from 1.0 to 2.0 in 0.1 increments. Default value is 1.0. The value programmed is the multiplier for the change in output when the program calls for unloading the steam valve. At the end of each sample period, if the program determines that it is necessary to unload the steam valve, the decrease in the 4-20ma output signal that would normally occur, is multiplied by the programmed **unload** value. For example, if the program determines that the output should decrease 2.0ma and the **unload** value is 1.5, the output would decrease 3.0ma (i.e.  $2.0 \times 1.5 = 3.0$ ). The greater the number programmed, the faster the unit (steam valve) will unload. This can be helpful for short water loops, light load conditions and applications where loads are shed rapidly.
- 3.) **Sample Factor** – Programmable from 0.5 to 16 minutes in 0.1 minute increments. The default value is 4.0 minutes. The value programmed for the **sample factor** determines what the sample/output interval will be after the initial 1 minute interval criteria is satisfied each time the unit is started. The 4-20ma output is allowed to change only at the end of each sample/output interval. Every time the unit is started, the sample/output interval is 1 minute until the steam valve reaches 50% position or the leaving chilled water temp (LCWT) is within 5°F of the LCWT setpoint. After that, the interval will be whatever is programmed as **sample factor**. For example, if 2.0 is programmed, each time the unit is started, the sample/output interval will be 1 minute until the steam valve command reaches 50% or the LCWT is within 5°F of the LCWT setpoint; it will be 2 minutes thereafter. This value should be adjusted for optimum LCWT control.
- 4.) **DAC Divide Value** – Allowable programmable values are 1, 2, 4, 8. The default value is 1. After the LCWT gets within 5°F of the LCWT setpoint, at the end of each sample/output interval the change in the 4-20ma output will be divided by the programmed **DAC Divide Value**. For example, if the called for output change would be for an increase of 2.5ma, and the **DAC Divide Value** is programmed as 4, the actual change in output would be an increase of 0.6ma ( $2.5/4 = 0.6$ ). This value can be adjusted to provide smaller changes in out-

put when the LCWT is near setpoint. This prevents overshoot and undershoot of the LCWT setpoint.

- 5.) **Rate Limit** – Programmable from 0.3°F to 2.0°F in 0.1°F increments. Default value is 1.0°F. Value programmed determines the sensitivity and response to the rate of change of the leaving chilled water temperature (LCWT). The "rate of change" is defined as the amount of change of the LCWT in the sample/output interval. The LCWT's rate of change is calculated over each sample/output interval. At the end of each sample/output interval, the rate of change is compared to the programmed **rate limit** value. The closer the rate of change is to **rate limit**, the greater the rate component will be in the change in output. In other words, the greater effect rate of change will have on the change in output. This means that rate sensitivity increases as the programmed **rate limit** value is decreased.

**TO PROGRAM THE ABOVE SETPOINTS** - Enter "PROGRAM" mode using access code 1-3-8-0, then proceed as follows:

#### Minimum Allowed Loading

- 1.) Press "UNLOAD" key. "MIN ALLOWED LOADING = XX%" is displayed.
- 2.) Enter desired value. Use leading zeroes where necessary (i.e. 05%). The value entered must be less than the value entered for "MAX ALLOWED LOADING" setpoint. Otherwise, "OUT OF RANGE - TRY AGAIN" is displayed.
- 3.) Press "ENTER" key.
- 4.) Press "PROGRAM" key to exit or continue to next.

#### Rate Limit, Unload

- 1.) Press "CHILLED WATER TEMPS" key. "RATE LIMIT = X.X: UNLOAD = X.X" is displayed.
- 2.) Enter desired value for rate limit. Then enter desired value for unload. Use leading zeroes where necessary (i.e. 0.5).
- 3.) Press "ENTER" key.
- 4.) Press "PROGRAM" key to exit or "ADVANCE DAY/SCROLL" key to continue to sample factor prompt.

#### Sample factor

- 1.) Press "CHILLED WATER TEMPS" key. Press "ADVANCE DAY/SCROLL" key until "SAMPLE FACTOR = XX.X" is displayed. Each time the "ADVANCE DAY/SCROLL" key is pressed, the message will alternate with a different message.
- 2.) Enter the desired value. Use leading zeroes where necessary (i.e. 05.0).

- 3.) Press "ENTER" key.
- 4.) Press "PROGRAM" key to exit or "ADVANCE DAY/SCROLL" key to continue to "DAC Divide Value" prompt.

#### DAC Divide Value

- 1.) Press "Chilled Water Temps" key. Press "Advance Day/Scroll" key until "DAC Divide Value = X" is displayed. Each time the "Advance Day/Scroll" key is pressed, the message will alternate with a different message.
- 2.) Enter desired value.
- 3.) Press "Enter" key. Press "Program" key to exit.

#### STEAM VALVE SELECTION

The position of I/O expansion board program jumper **JP2** determines which steam valve output will be enabled. This jumper must be installed or cut depending on which steam valve is used as follows:

**In** - Honeywell steam valve. Enables the 115VAC pulse width modulation (PWM) output from the relay board.

**Cut** - Leslie Steam Valve. Enables the 4-20ma output from the I/O expansion board J3.

#### GAS/OIL BURNER CALIBRATION

The BURNER CALIBRATION procedure has been modified. The **full fire mode setpoint** selection and the **percent of full fire** of the **alternate mode** programming procedure, has been separated from the BURNER FULL TRAVEL CALIBRATION procedure. The following is a description both procedures as they are now performed with this EPROM version. The burner calibration theory is explained in SERVICE MANUAL 155.17-M2.

#### BURNER FULL TRAVEL CALIBRATION

- 1.) Micro board PROGRAM JUMPER JP1 (gas/oil units) and J51 (limit override) must be installed prior to performing this procedure.
- 2.) The following setpoints must be programmed as follows prior to performing this procedure. These setpoints limit loading and will prevent the burner from going to "full travel". If these setpoints are not set as follows, the BURNER FULL TRAVEL CALIBRATION will not be correct.
  - a.) "MAX ALLOWED LOADING" must be set to **100%**.
  - b.) "AUTO-TEMP CONTROL DELAY" must be set to **0** minutes.
  - c.) "PULLDOWN DEMAND LIMIT" must be set to **0** minutes, start **100%**, stop **100%**.

After the burner calibration is completed, these setpoints must be returned to their original values.

- 3.) The unit must be running in **service** operating mode.
- 4.) Enter **program** mode using access code 1-3-8-0. "PROGRAM MODE, SELECT SETPOINT" is displayed.
- 5.) Press **auto** key. "PERFORM BURNER CALIBRATION? (1=YES;0=NO)" is displayed and the burner is driven toward the closed position. If it is desired to perform the following procedure, press **1**. Otherwise, press **0** to exit. If **0** is pressed, "PROGRAM MODE, SELECT SETPOINT" is displayed.

**Note:** If at any stage in the calibration process it is desired to terminate the procedure, press the "\*" key. All previously programmed calibration values are retained. Also, any unit shutdown during this procedure, terminates the procedure.

- 6.) Press **enter** key. "BURNER CONTROL CURRENT = XX.Xma" is displayed. The burner will be driven open until it reaches the full travel position and stops rotating. The current displayed is that which is being output to the burner control. It will increase as the motor rotates toward full travel position.
- 7.) At the instant the motor reaches full travel position, the person at the burner must signal the person at the Control Center to capture the motor current value. This is done by pressing the **hold** key. For dual burner units, both burner persons must signal, with the last signal used for the capture. The lowest current value that will be accepted is 18.3ma. Lower current values will be ignored by the software. Pressing the **hold** key also causes the motor to reverse direction and travel toward the minimum travel position.
- 8.) When the motor reaches minimum travel position, the person at the burner must signal the person at the Control Center to press the **hold** key to capture the motor current value. For dual burner units, both persons must signal with the last signal used for capture. The highest current value that will be accepted for minimum travel is 5.0ma. Higher current values will be ignored by the software.
- 9.) "FULL FIRE CONTROL RANGE = XX.Xma TO XX.Xma" is displayed.
- 10.) Press the **enter** key. "PROGRAM MODE, SELECT SETPOINT" is displayed.
- 11.) Press **program** key to exit. The normal foreground message is displayed.

- 12.) Remove micro board program jumper J51.
- 13.) Return setpoints changed in step 2 to their original values.

### FULL-FIRE MODE SETPOINT

This procedure must be performed after the above BURNER FULL TRAVEL CALIBRATION is performed. If the unit only operates in **cooling only** mode, the "FULL FIRE MODE" is programmed to "CLG". If the unit operates in both **cooling only** and **heating only** mode, typically one mode requires a different maximum burner output that is higher than the other. The mode requiring the highest maximum output becomes the "FULL FIRE MODE" of the unit. The maximum burner output of the remaining mode will be a percentage of full fire rate of the unit. The procedure to determine the percentage of full fire for the lessor mode is in SERVICE MANUAL 155.17-NM1.

- 1.) Enter **program** mode using access code 1-3-8-0. "PROGRAM MODE, SELECT SETPOINT" is displayed.
- 2.) Press **hold** key. "FULL FIRING MODE=0 (0=CLG;1=HTG)" is displayed.
- 3.) Using **entry** keys, press **0** or **1** as appropriate or press **advance day/scroll** key to advance to the next prompt in step 5. If the **cancel** key is pressed, default value **0** is displayed.
- 4.) Press **enter** key.
- 5.) Press **advance day/scroll** key. "MAX MMM IN-

PUT = XXX% OF FULL FIRE" is displayed. "MMM" is automatically replaced by the alternate mode from that which was designated as the full fire mode in step 3.

- 6.) Using the **entry** keys, enter the percentage of full fire for this mode. The procedure to determine this percentage is detailed in YORK ABSORPTION SERVICE MANUAL 155.17-NM1.
- 7.) Press **enter** key.
- 8.) Press **program** key to exit. The normal foreground message is displayed.

### CONDENSER WATER FLOW SWITCH SHUTDOWNS

Condenser water flow switch cycling shutdowns now operate as follows:

If the condenser water flow switch opens while the unit is running, a **cycling** shutdown is initiated, "DAY-TIME-COND FLOW SWITCH - AUTOSTART" is displayed as STATUS and a normal dilution is performed. If the flow switch closes before the dilution terminates, the unit will automatically restart. However, if the flow switch does not close before the dilution terminates, the **cycling** shutdown becomes a **safety** shutdown coincident with the dilution termination, all pumps are shut off and "DAY-TIME-COND FLOW SWITCH" replaces the previous **cycling** shutdown message (the day and time displayed is the time the cycling shutdown occurred; this provides a record of the initial event.) If the safety shutdown occurs, the unit can be restarted by moving the **unit switch** to "STOP-RESET", then to "START" position.

