Typical Pilot Arrangement for TwinBed II

**Air (pilot/cooling) Line (for -7A thru -8B TwinBed II)**

1. 7349-3-G 1½" pressure reducing regulator, green spring (7-16 osi)
2. 1836-03 ¼" needle valve, cooling air pressure measurement
3. 1122-3 1½" pilot air butterfly valve
4. 1836-03 ¼" needle valve, pilot air pressure measurement
5. 8777-3 1½" flexible nipple
6. 1122-2 1¼" cooling air butterfly valve
7. 1836-03 ¼" needle valve, cooling air pressure
8. 8777-2 1¼" flexible nipple

**Air (pilot/cooling) Line (-9 thru -12B TwinBed II)**

1. 7349-4-G 2" pressure reducing regulator, green spring (7-16 osi)
2. 1836-03 ¼" needle valve, air pressure measurement
3. 1122-3 1½" pilot air butterfly valve
4. 1836-03 ¼" needle valve, pilot air pressure measurement
5. 8777-3 1½" flexible nipple
6. 1122-3 1¼" cooling air butterfly valve
7. 1836-03 ¼" needle valve, cooling air pressure
8. 8777-3 1¼" flexible nipple

**Gas Line (all burner sizes)**

9. 1821-02 ¼" ball valve
10. 1486A-02 ¼" solenoid valve
11. 7350-02-A ¼" regulator
12. R930-6055 ¼" needle valve
13. 1836-03 ¼" needle valve, pilot gas pressure measurement
14a. 4020-3-CB nozzle mix pilot tip for -9 thru -12B burner sizes
14b. 4020-3A-CB nozzle mix pilot tip for -7A thru -8B burner sizes
15. 1836-03 ¼" needle valve (cooling air, pilot UV)
16. 1836-03 ¼" needle valve (cooling air, main UV)
17. see page 3 main flame scanner assembly and adapter with cooling air connection.
18. 4065-6NI-6A ignition transformer
19. 4085-5 ignition cable, 5'

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Indicates pressure reference line
Min. 3⁄8" OD tubing
The above diagram shows the relationship between the flame scanners and introduction of main fuel. Each TwinBed II burner uses two flame scanners. One to monitor the pilot flame and one to monitor the main flame. The main flame scanner mounting is such that it can not "see" the pilot flame.

**NOTES:**

1. Prior to the pilots being ignited, both the pilot and main flame scanners are "switched" on (electrically connected to the flame controller) so the flame controller can perform a diagnostic check of both scanners.

2. In the "Stop Cycle" mode, all air, exhaust, and fuel "cycle valves" are closed. The flame monitoring is of the pilot flame only.

3. When the burners are firing "conventionally", with main fuel being introduced through the "burner fuel" connection, the pilot scanner is "switched" off. In this "state", the flame monitoring system will be maintained by the main scanner "seeing" the main flame even though the pilot is still burning. The "exhausting" burners flame monitoring system is maintained by detection of its pilot flame.

4. When the burners are firing in the "injector mode" (LNI), the flame monitoring system is maintained by the pilot scanner in both the firing and exhausting burners. The primary safety limit for the introduction of main fuel, in addition to all other required limits, is proving the furnace and by-pass flow are above "auto ignition" temperature.

**INFORMATION ON PAGE 1 SCHEMATIC**

**Air Pressure Regulation**

Because of the wide swings in backpressure that occur when TwinBed II cycles between firing and exhausting, a regulator (item 1) is used to maintain constant pressure drop across the pilot and fuel tube cooling passage. Constant pressure drop translates into constant flow.

**Flame Scanners:**

Flame scanners other than Honeywell C7061 or Fireye 45UV5 require different adapters than listed. Contact FivesNA for information. Page 3 lists scanner assembly details, items 14 and 17.

**Pressure Reference Lines**

Pressure reference lines (lines with hash marks) to regulator diaphragm chambers may be ⅝ or ⅞ stainless steel or copper tubing. Do not use steel tubing which will rust and may eventually block the passage.

**Typical Pilot Adjustments**

**CAUTION!** Standards-compliant functioning of the Flame Detection System can be compromised if the pilot system is not configured and adjusted strictly in accordance with the information outlined in Sheet 4343-3.

Set pilot with zero main burner air pressure.

**Pilot Location**

The TwinBed in the schematic has the pilot located on the left side and main UV on the right (4343-BL1). Locations of pilot and main UV can be reversed (4343-BR1). See "Order 4343" or "Dimensions 4343."

**Cooling Air Flow and Pressure Drop Across Fuel Tube**

Adjustments should be made in stop cycle mode so that backpressure is constant. Adjust #6 cooling air butterfly valve.

**Air Supply to Pilot/Cooling Air Regulator**

The 7349-3 regulator requires 20.5"wc (11.8 osi) inlet pressure and the 7349-4 regulator requires 18.0"wc (10.4 osi) inlet pressure. The maximum pressure drops that make up total air required are listed in the table below.
Flame Scanner Assemblies for Pilot and Main Flames

**UV Scanner Assembly / Pilot Assembly**

- 4020-3A-CB pilot for burner sizes -7A thru -8B
- 4020-3-CB pilot for burner sizes -9 thru -12B

Add anti-seize and lubricating compound to threads on pilot at installation (such as "Never-Seez" P.N. R790-1007)

Shaded area is pilot adapter and pilot adapter connection (part of TwinBed® II)

**Typical UV Scanner Assembly**

- Cooling air inlet

**UV Scanner Assemblies for Main Flame and Pilot**

(two assemblies required per burner)

<table>
<thead>
<tr>
<th>Assembly number</th>
<th>UV Scanner</th>
<th>Scanner part number</th>
<th>Adapter</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>4-47709-1</td>
<td>Honeywell C7061</td>
<td>R-130-5851</td>
<td>8835-R</td>
<td>10.25&quot;</td>
</tr>
<tr>
<td>4-47710-1</td>
<td>Fireye 45UV5</td>
<td>R-130-2151</td>
<td>8839-R</td>
<td>12.30&quot;</td>
</tr>
</tbody>
</table>
TwinBed® II Pilot Setup and Trouble-Shooting
GENERAL SETUP — 4343 BURNER PILOT SYSTEM

Warning: Startup and adjustment of combustion equipment should only be done by trained personnel familiar with combustion technology, combustion equipment, and with the particular burner system, equipment, and controls.

CAUTION! Standards-compliant functioning of the Flame Detection System can be compromised if the pilot system is not configured and adjusted strictly in accordance with the information outlined in Sheet 4343-3.

Refer to pilot schematic on page one for item numbers.

1. All fuel valves to furnace should have been closed during shutdown (both main and pilot valves).

2. Purge the furnace in accordance with local standards requirements.

3. Adjust the main burner air flow to its lowest operating condition (for instance, with air flow conditions of a hot regenerator at light-off).

4. Open manual gas shutoff valves (not shown on schematic) to get gas pressure to inlet of closed pilot manual valve. Set gas supply pressure to pilot system between 12 and 16 osi. Note: Gas pressure must be set when gas is flowing. Make final adjustments to gas supply pressure once pilot is burning.

5. Turn open six turns the adjustment plug of the pilot gas limiting orifice valve.

6. Place the 4343 Burner in stop cycle mode (main burners off, blower running).

7. Set the pilot air regulator for a 4 osi (7"wc) pressure measured at the cooling air needle valve. Refer to "Air Supply to Pilot/ Cooling Air Regulator" on page 2 for air pressure information.

8. Set fuel-tube cooling-air pressure at item to 1"wc.

9. Make sure UV cooling air valves are open and air is flowing to UV mounting adapters.

10. Run trial for pilot ignition (power ignition transformer and open pilot gas solenoid valve). Slowly open pilot gas shutoff valve. Adjust pilot gas limiting orifice valve until 4.3"wc is measured at the pilot gas pressure tap. The pilot should ignite.

11. CAUTION! Verify that the pilot flame cannot be sensed by the main flame scanner, as this could permit a hazard to persist, and is indicative of a pilot setup issue. If the main flame scanner senses the pilot flame, confirm settings, readjust pilot and burner settings and retest until the main flame scanner does not sense the pilot flame.

12. If pilot does not ignite, see page 5.
Problem Possible Cause

A. Pilot does not light
   1. No spark.
   2. Pilot tip (14a) dirty or plugged.
   3. Pilot air pressure is not correct.
   4. Pilot gas pressure is not correct.
   5. Pilot gas solenoid valve (19) not opening.

B. Pilot goes out after lighting:
   1. Pilot tip (14a) dirty or plugged.
   2. Pilot UV (14b) not seeing flame.
   3. Incorrect pilot air pressure.
   4. Incorrect pilot gas pressure.
   5. Incorrect upstream pressure to ratio regulator (11).

Possible Correction

- Check spark plug (14a) for carbon or no gap; ignition transformer (18); and ignition wire (15) for electrical continuity, short or failed/burned insulation.
- Clean.
- Measure with a manometer when the main burner is in stop cycle mode. If not correct, adjust pilot air regulator (1) accordingly.
- Measure with a manometer when the main burner is in stop cycle mode. If not correct, adjust pilot gas needle valve (12) accordingly.
- Check for power to gas solenoid valve.
- Open.
- Clean.
- Clean or replace UV cell (14b), clean window in adapter (see drawing, page 3).
- Adjust air butterfly valve (3).
- Adjust gas needle valve (12).
- See setup instructions (above) and adjust.
TwinBed® II Combustion Air Bypass

Purpose

The purpose of the TwinBed II combustion air bypass system is to prevent overheating of the regenerator bed and support structure while the burner pair is in pilot-only mode.

While in pilot-only mode, both the combustion air and the exhaust air cycle valve are in the closed position. As the valves have metal-to-metal seats (not intended as tight shut-off) there is a potential for leakage depending on the differential pressure across the valve. Typically a TwinBed II system's deadhead exhaust fan suction is greater than the deadhead air fan pressure. Accordingly the exhaust valve natural leakage is greater than that of the combustion air valve, creating a negative pressure in the regenerator plenum which pulls hot gases from the furnace chamber into the regenerator bed. As a result while in pilot-only mode for extended periods of time, the depth of the hot zone in the regenerator media bed will increase and will potentially overheat the plenum.

Prevention

To prevent the bed from overheating while in pilot-only mode, a controlled volume of air is by-passed around the combustion air cycle valve. This air flow is adjusted to satisfy the rate of exhaust valve leakage and achieve a neutral-to-slightly-positive regenerator plenum pressure relative to the furnace chamber, eliminating the outward flow of hot gases.

Adjustment

While the burner pair is in pilot-only mode and at operating temperature, connect the positive side of a differential pressure gauge onto the pressure tap located on the rear of the TwinBed plenum. Connect the negative side of the pressure gauge onto the pressure tap located on the rear of the TwinBed burner head. Adjust the bypass valve until a slightly positive differential pressure is achieved to cause flow in the desired direction. This pressure is expected to be approximately +.02"w.c to +.04"w.c.