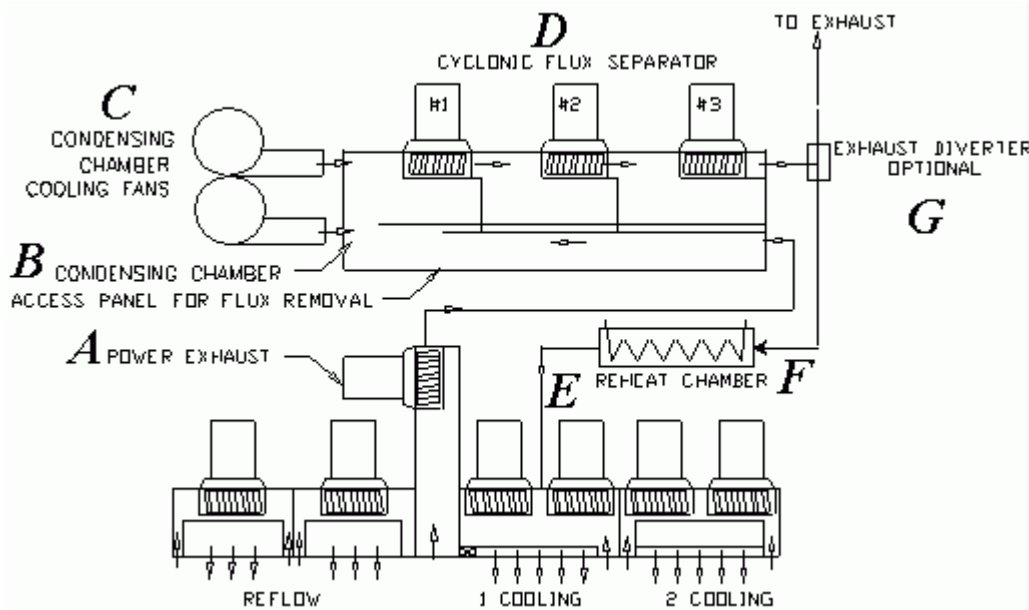


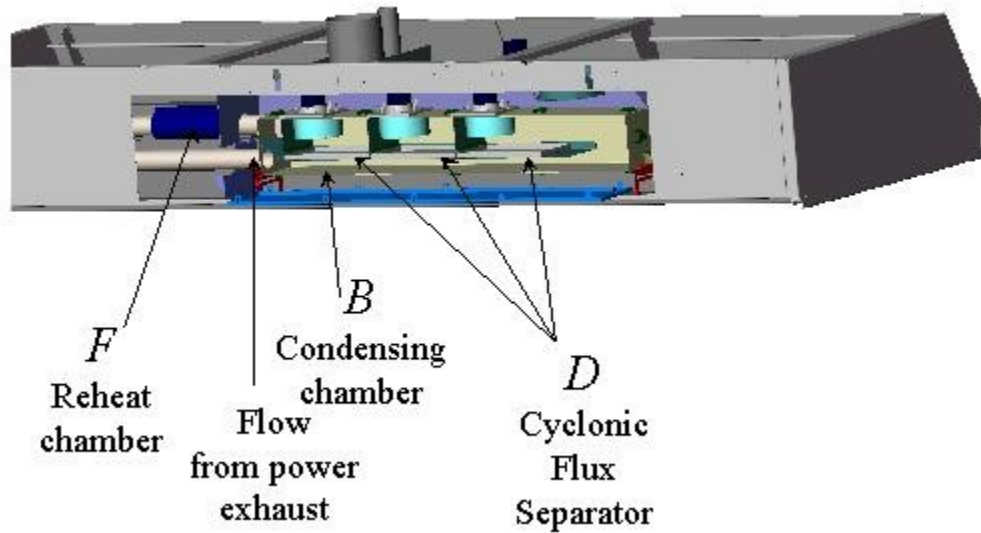
## Flux Management White Paper

*This paper will describe the new flux management systems that Heller Industries will introduce in 1999.*

The Generation 4.1 flux management system has been developed for machines equipped to run with an inert atmosphere and is the latest evolution of Heller Industries' successful flux management systems. The design goal for Generation 4.1 was to prevent flux accumulation and dripping inside the oven chamber and to minimize required maintenance. The system does not require cooling water, water pumps, or disposable filters.



Nitrogen Oven Flux Separation  
Schematic 1



Nitrogen Oven Flux  
Separation Schematic 2

The system works as follows:

Flux laden gas is drawn out of the oven through a power exhaust positioned between topside reflow and cooling (A).

The gas passes through the condensing chamber in the lower section of the flux separation box (B) and is cooled by ambient air blown on the outside of the box (C, Photo 1). As the gas cools, flux comes out of suspension and precipitates on the cool walls of the flux separation box. This action is much like moisture precipitating on a cool bathroom mirror while taking a shower.



Flux Separation Box Showing Cooling Fans  
Photo 1

The cooled gas then passes through three cyclonic flux separator blowers in series on the topside of the flux separation box (D). These blowers spin the flux laden gas and cause the flux particles to separate from the main gas stream as in a cyclonic separator. The separated flux forms a puddle underneath the blower housing within the flux separation box. This accumulation can be easily removed at regular intervals ranging from monthly to yearly depending on throughput and flux type (Photo 2).



Access To Flux Separation Box For Routing Maintenance  
Photo 2

After passing through the flux separation box, the gas recirculates into the oven through the cool zone(s) (*E*). In order to prevent any additional flux vapor from precipitating in the cool zone, the gas is heated slightly before it reenters the cool zone (*F*). This reheat is much like clearing a fogged bathroom mirror with a hair dryer before shaving.

Many customers purchase inert atmosphere capability on their ovens but opt to run with an air atmosphere. Generation 4.1 can be configured by the customer to vent the flux separation box output to exhaust for maximum flux elimination (*G*). The transition back to inert atmosphere capability would require less than 1/2 hour and simple tools.

A panel heater is mounted on the top of the entrance tunnel. This heater keeps the sheet metal above flux condensation temperature to prevent flux accumulation and dripping.

Maintenance of the Generation 4.1 system is very simple. At intervals between 1 month and 1 year the machine should be allowed to run for approximately 1 hour on a factory installed profile that allows the flux separation box to run warmer than flux condensation point. The accumulated flux will melt and be blown into a corner of the flux box. After a number of these warm cycles the flux box should be opened from the rear of the machine to remove the accumulated flux. This flux removal procedure should require approximately 1 hour including time for cooldown and warm-up.

The major advantages of Generation 4.1 over previous generations are as follows:

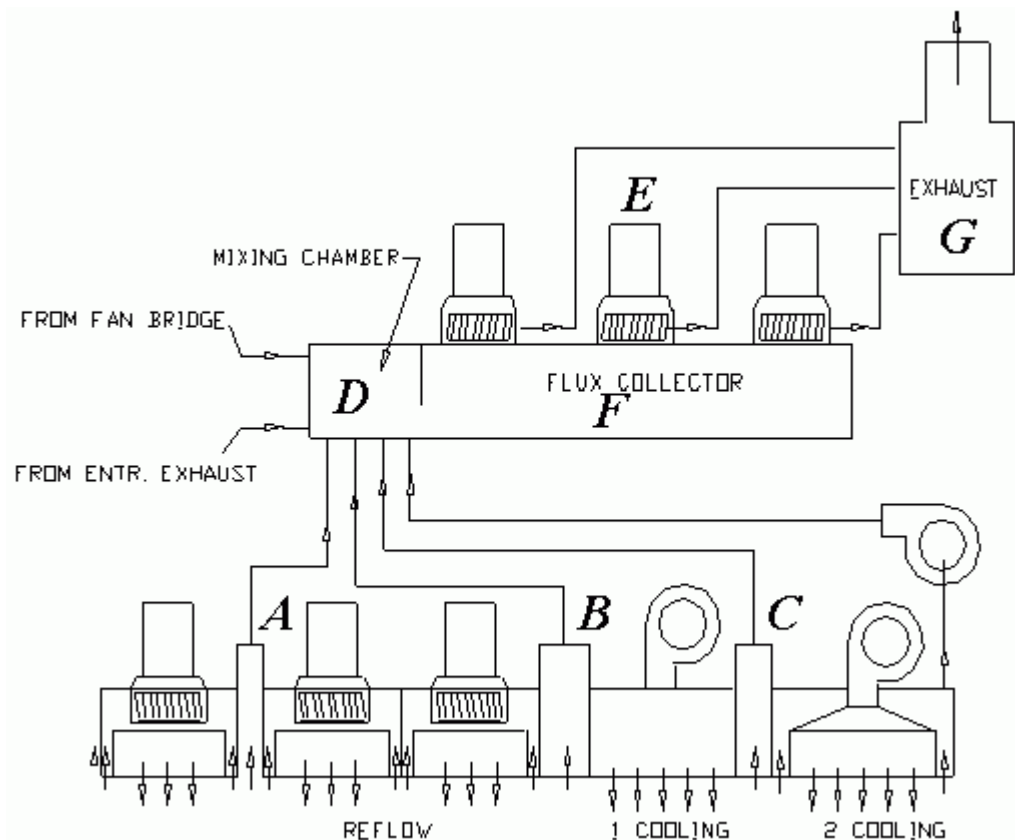
- The elimination of cooling water and water pumps

- The elimination of disposable filters.

- Greater flux removal.

- Longer maintenance interval with easier cleaning.

Much of the flux separation technology utilized in Generation 4.1 such as air to gas cooling, cyclonic separation, as well as gas recirculation into the cool zone are proven methods that have been used for many years on previous Heller flux management systems. Generation 4.1 is the next evolution of a well tested design. Generation 4.1 is also available as a retrofit to all existing Wide Body models.



Air Oven Flux Separation Schematic 2

The Generation 1.0 air flux management system has been developed for machines built to run with air atmospheres. The design is similar to Generation 4.1 and operates as follows:

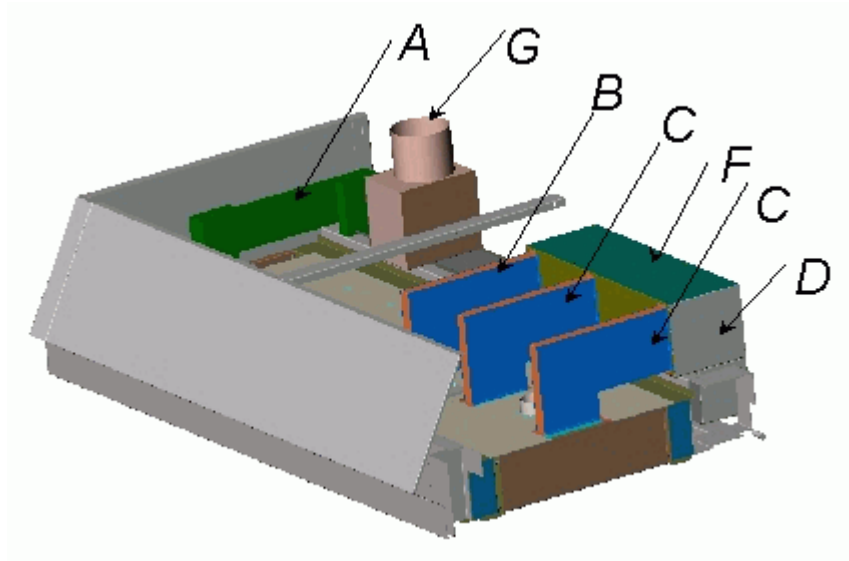
The flux laden gas is drawn from the oven through three exhausts, before preheat, (A) before reflow (B) and between reflow and cooling (C).

The gas is then mixed with cool makeup air (D). This air both cools and dilutes the flux vapors.

The mixture then passes through three cyclonic separator blowers (E). Flux collects underneath these blowers and can be removed periodically as with Generation 4.1 (F).

The output of the flux separation box is then routed to an external exhaust (G).

A slightly modified version of Generation 1.0 Air Flux is available as a retrofit to all Wide Body models.



Air Oven Flux Separation  
Schematic 2